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# The Workshop on Energy Development Issues Affecting Appalachia

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# FINAL REPORT ON THE WORKSHOP ON ENERGY DEVELOPMENT ISSUES AFFECTING APPALACHIA

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# FOREWORD

When energy and material resources are extracted, processed, converted, and used, the related pollutional impacts on our environment and even on our health often require that new and increasingly more efficient pollution control methods be used. The Industrial Environmental Research Laboratory-Cincinnati (IERL-Ci) assists in developing and demonstrating new and improved methodologies that will meet these needs both efficiently and economically.

Development of our Nation's energy resources has had, and will have, significant impacts upon our economy, social institutions and environment. These consequences of meeting our energy demands must be understood if energy development is to be undertaken with proper concern for the interests of all the parties that it affects. The workshop on energy issues affecting Appalachia was held by the Environmental Protection Agency (EPA) with the assistance of the Appalachian Regional Commission (ARC) in order to improve both agencys' knowledge of how energy activities may change in the Region and how Regional interests may be affected by those changes.

Appalachia is one of several regions in the United States where greatly expanded energy activities may occur in the near future as this nation turns increasingly to utilizing its own energy resources. Both the EPA and the ARC have deep interests in how energy development occurs in the Region.

The EPA is responsible for insuring that the environmental impacts of man's activities are identified and properly handled. Besides regulating current activities for the purpose of environmental protection, the Agency carries on research to better understand how we are altering the environment today, as well as how we may affect it in the future. Studies of regional energy development are an important component to EPA's research program. They allow the Agency to understand not only the environmental features that are dominate in a region, but also the social, economic and institutional structures which will shape future energy activities there. This provides a more comprehensive picture of the context within which approaches for protecting a region's environment must ultimately be implementable. It also identifies a region's unique environmental problems which must be considered when formulating nation-wide policies and regulations.

The ARC is concerned with energy in Appalachia because of its broad mandate to stimulate economic development there. The Commission was directed to become even more directly involved with energy development in the 1975 Amendments to the Appalachian Regional Development Act. In its statement of findings and purpose in the amended Act, the Contress:

> "Recognizes also that fundamental changes are occurring in national energy requirements and production, which not only

> risk short-term dislocations but will undoubtedly result in major long-term effects in the region. It is essential that the opportunities for expanded energy production be used so as to maximize the social and economic benefits and minimize social and environmental costs to the region and its people. It is, therefore, also the purpose of this Act to provide a framework for coordinating Federal, State and local efforts toward (1) anticipating the effects of alternative energy policies and practices, (2) planning for accompanying growth and change so as to maximize the social and economic benefits and minimize social and environmental costs, and (3) implementing programs and projects carried out in the region by Federal, State and local governmental agencies so as to better meet the special problems generated in the region by the Nation's energy needs and policies, including problems of transporation, housing, community facilities, and human services."

An important initial step for both agencies to take in anticipating the consequences of energy development is the analysis for the major issues that are associated with present and future energy activities. These issues reflect conflicting interests; they arise because change brings advantages for some and disadvantages for others. To arrive at decisions that reflect these diverse interests in a balanced fashion, the tradeoffs associated with alternative courses of action must be evaluated. It is the intent of issue analysis to contribute to the process of decision making by identidying energy issues, determining why those issues exist, and then supplying decision makers and interest groups with the information they need to better understand the overall implications of actions that they propose.

The workshop described in this report was held to take the first step in this analysis process. It's goal was to supply a better understanding of the interests and concerns of groups ultimately involved in Appalachia's development. The results of this workshop will aid in determining agency research objectives and will enable special interest groups and other government agencies to better appreciate how Appalachia functions and what the desires of those working and living in the region are.

David G. Stephan
Director
Industrial Environmental Research Laboratory
Cincinnati

## ABSTRACT

This report describes the results of a workshop involving representatives of private industries, government agencies, and public interest groups that was held in January of 1979 to raise and discuss issues related to Appalachian energy development. The workshop was sponsored by the Environmental Protection Agency with the assistance of the Appalachian Regional Commission. The report summarizes the issues identified by these individuals over a two-day period. The summarization attempts to clarify the different points of view of interest groups on each issue. It also indicates the information that participants felt future studies of Appalachian energy ought to set forth in order to assist the decision makers who ultimately will act on those issues.

This report was submitted in fulfillment of Work Assignment Number 13 under Contract Number 68-03-2674 by Enviro Control, Inc. under the sponsorship of the U.S. Environmental Protection Agency. The report covers the period November 1, 1978 to September 25, 1979, and work was completed as of November 21, 1979.

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## ACKNOWLEDGEMENTS

The authors wish to thank those individuals who participated in the workshop sessions for the enthusiasm with which they contributed to those two days of discussions. Their patience throughout the loosely structured sessions was gratifying and their candidness and willingness to listen to other points of view added greatly to clarifying the diverse interests and problems that exist within Appalachia.

Our thanks also go to Professor Gary Fowler, Department of Geography, University of Illinois at Chicago Circle, who acted as co-facilitator of the Energy End Use Session.

Finally, we would like to thank those other individuals in Enviro-Control, Incorporated, the Appalachian Regional Commission, and the Industrial Environmental Research Laboratory, Cincinnati, who contributed to this project.

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## SECTION 1

## INTRODUCTION

### PURPOSE OF THE DOCUMENT

This report summarizes the findings of the Workshop on Energy Development Issues Affecting Appalachia that was held in Atlanta, Georgia, on January 9-10, 1979. The main issues and concerns that were raised by the participants during that workshop are identified and discussed. In addition, we have described the participants' differing opinions on these issues. Finally, we describe their suggestions of further research on energy development in the Region. The participants felt that such research might be valuable to them as they attempt to better grasp the complexities of Appalachia's social and economic fabric and of its natural environment. This understanding will allow them to make decisions and to present their views more knowledgeably. Such research is also needed to build a common base of information for facilitating communication among the different interests in the Region.

It is the intent of the report's authors to convey through this report the concerns that various representatives of private industry, government agencies, and public interest groups perceive Appalachia to be facing over the next twenty-five years. The report also sets forth the conflicts of interest that exist or are likely to arise among and within these groups. The economic, environmental, and social consequences of energy development are many, and they ultimately impact everyone in the Region in one way or another. Numerous choices of the type, rate, and level of expanding energy supply systems exist, and an array of decision makers are involved in choosing among these alternatives. These individuals need to know what the impacts of their decisions will be, who will be impacted, and how they may react. The interest groups represented in the workshop will be influencing or making these decisions. They are involved in Appalachian energy development and are in a good position to present the problems that might be expected to occur and to indicate how future policies may affect their interests.

### BACKGROUND

The workshop was held to provide its sponsors and participants with a better understanding of the principle issues associated with energy activities in Appalachia. It was anticipated that a workshop would identify the important factors affecting change in the Region, along with the impacts that might result. The discussions would also indicate the costs, benefits and uncertainties that must be considered when deciding how future energy activities might "best" occur. For government agencies, such an overview provides a more realistic context within which to plan research projects and program

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needs. For the special interest groups involved, the workshop provided a forum for reasoned discussion of their concerns.

To these ends, a cross section of industry, government, and public interest group representatives were invited to participate in the two-day discussions. Prior to the workshop, participants agreed to join one of three small discussion groups. Each group focused its attention on one of the following parts of the energy supply chain:

1. Resource Extraction
2. Energy Conversion Facilities
3. Energy End Use

The facilitators for the sessions were Mike Newton, Ben Blaney, and Vic Jelen and Gary Fowler, respectively.

The groups met most of January 9 and the morning of January 10. While the facilitators chose to provide some structure to each group's discussion, the amount of direction was limited; participants were fairly free to shape their conversations within the confines of each topic area.

A plenary session was held on the afternoon of January 10. At that point, the findings of each group were summarized and discussed by all those involved in the workshop.

CAVEATS

It is difficult to obtain a balanced and representative group of participants and to spend adequate time on each important topic. The Workshop on Energy Issues Affecting Appalachia was no exception, and the reader must bear this in mind when considering the issues summarized in this document.

The participants were chosen with the intent of bringing together a cross section of Appalachian interest groups. While a workshop of this limited size makes it difficult to represent all points of view, the discussions revealed that several different sides to each issue were usually present. Obtaining varied perspectives was facilitated by the candidness of the participants and by the consideration they showed toward each others' ideas.

No attempt is made in this report to formally prioritize the issues presented here. The workshop participants knew from the onset that we were interested in what they thought the important issues were for Appalachia. The reasons for the importance of an issue were frequently enunciated during the discussions and are part of our summary. In the concluding section, several issues that appeared frequently during the workshop (thus reflecting their importance) are described.

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The summaries that follow are the authors' interpretations of the workshop discussions. They are based on transcripts* of the group sessions and on personal notes.

## REPORT STRUCTURE

The body of the report contains three sections. Section 2 summarizes the principal issues discussed in the workshop and highlights important considerations for those undertaking an assessment of Appalachian energy activities. Section 3 summarizes the discussion in each workshop group, while Section 4 describes some of the main issues that pervaded all three group sessions.

The appendices to the report provide supplementary information on the workshop. Included are the agenda of the workshop, a list of the participants, and two documents that were supplied to workshop participants prior to their arrival.

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*One of the conditions of the workshop was that there would be no direct quotes or references to specific individuals in the final report.

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## SECTION 2

## REPORT SUMMARY

The workshop was held to allow those involved in Appalachian energy research to gain a better understanding of why these issues exist and what might be done by the Region's decisionmakers to respond to them. Additionally, and most importantly, the workshop was intended to show where there are gaps in knowledge which prevent decisionmakers from making an adequate response. Besides providing insight for those involved in studying Appalachian energy, it was hoped that workshop participants would come away with a better appreciation for how other Appalachians view energy growth in the Region.

To insure that all participants had a chance to be heard, they were divided into three groups of twelve to fifteen people. Each group had a single area of energy processes to discuss: energy resource extraction, energy conversion facilityes or energy end-use. During the time that these groups met, their discussions appeared to be candid. Numerous specific examples were presented to support ideas. Opposing points of view were raised and often strenuously debated. But, all sides were ready to listen to different perceptions of the problems and, in some cases, it appeared that participants were closer to consensus by the end of the workshop (although this was not an objective of these sessions).

As would be expected in "brainstorming sessions" such as these, it was not always possible to get the groups to reach a consensus on definitive statement for the issue they raised. For the resource extraction session, a list of the major questions that highlighted the discussions were extracted from reading the session transcripts. They are listed in Table 1. In both the conversion facility session and the energy end-use session, the participants developed their concerns. These are presented in Tables 2 and 3. Section 3 of the report summarized the discussions that revolved around each of these sets of issues.

There were also four issues that appeared to pervade all of the workshop discussion. These were:

1. What needs to be considered during the formulation of future policies on Appalachian energy development?
2. How should the burdens and benefits of energy development in Appalachia be distributed?
3. How can the effectiveness of regulations be improved while constraining the cost of their implementation? and

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## TABLE 1. LIST OF MAJOR ISSUES COVERED IN THE RESOURCE EXTRACTION SESSION

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- How do environmental regulations affect small coal mine operators?
- What are the effects of increased government regulation on the competition of coal with oil and gas?
- Will extraction technology improve substantially in the near future?
- What are the effects of current regulations on technological innovation?
- Would areawide environmental regulations be more effective than site-specific permitting?
- Who will assume the increased economic burdens on society of coal production?
- How can quality-of-life issues achieve a larger role in the decisionmaking processes associated with coal extraction?

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## TABLE 2. CONVERSION FACILITY SESSION LIST OF PROBLEMS TO BE ADDRESSED IN AN ASSESSMENT OF APPALACHIAN ENERGY DEVELOPMENT

- What mechanisms exist for dealing with the long-range transport and cumulative effects of air pollution?
- What will be the impact of air regulations on state and regional economic development? In particular, what tradeoffs must be considered when allocating air pollution increments for Prevention of Significant Deterioration (PSD)?
- What effect would clear air regulations have on developing energy technology?
- What are the net economic costs and benefits to various government jurdisdictions that would result from establishment of different types of institutional frameworks to manage the development of energy facilitites and their associated impacts?
- What impact would the promotion of alternative energy sources (synthetic fuel, biomass, etc.) have on regional development?
- What mechanisms exist, or could be created, to deal with the inconsistencies between state and federal EPA air pollution control regulations?
- How many differing attitudes of Appalachian communities toward development affect the type and location of future growth?
- What are the health tradeoffs associated with different energy conversion alternatives?
- What mechanisms exist for community control of, or at least involvement in, the conversion facility siting process?
- What will be the effects of different levels of energy production, as well as various energy conversion technology mixes, on the Appalachian region?
- What mechanisms exist for public participation in the siting and development of decisionmaking processes at both the state and multicounty levels?
- What effects do differing policies at different levels of government have on energy development?

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## TABLE 3. APPALACHIAN ENERGY ISSUES LISTED BY ENERGY END-USE GROUP

A. Central Issue: Lack of a Consistent National Policy on Fuel Utilization

B. Specific Issues Subareas:

- o Conmmunication among different levels of government (local, state, and federal) and between governments and the public
- o Centralization vs. decentralization of power generation
- o Growth management and development
- o Technological applications

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4. What should the scope of an Appalachian energy development study be?

The first three issues reflect the desire of many participants to see improved communication, more realistic regulatiions, and improved economic conditions within the Region. Issue four defines what the workshop participants felt researchers should try to accomplish in an Appalachian energy assessment and how such a study should be carried out. The main conclusions reached may be summarized as follows:

1. Study Purpose - The study should provide the Region's decisionmakers with a better understanding of the current energy activities in Appalachia and of the possibilities for future change and growth. There was disagreement, however, on what aspects of energy development should be emphasized. For some, the study should be a road map to coal development, for others it should focus on minimizing the environmental impacts of any type of energy development, while still others wanted it to investigate all the alternative sources of energy (e.g., coal, solar, nuclear) that could be developed in Appalachia by 2000.

2. Study Objectives - Three were emphasized: (1) define current energy activities and the possibilities of future change and growth, (2) investigate the credibility of past studies, and (3) include Appalachian interest groups in the study process.

3. Study Audience - While not given a clear-cut definition in the workshop, it appears to the authors of this report that a two-sided system might be appropriate. The study would address its findings to federal, state and local government agency needs (tier one), but include business and public interest groups (tier two) in the study so that they could learn from the process too and influence the direction of the study.

4. Study Geographic Scope - The study should not be confined to within the boundaries of the Appalachia Region, but should be scoped by the problems of the Region which is investigated. For example, strong demand for exporting energy will require investigating future market structures outside the Region.

5. Study Timeframe - The period from 1985 to 2010 should be investigated. This would allow researchers to consider how near-term decisions will affect future energy activities without looking so far to the future that the uncertainties of the findings would be of little immediate practical value.

All five issues are discussed at length in Section 4 of this report.

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## SECTION 3

## GROUP DISCUSSITONS

This section summarizes the discussions of each of the three workshop sessions. Issues and problems that surfaced during each session are identified and the different perspectives voiced by the various parties are given. However, because the sessions were loosely structured and limited in time, and because they covered broad topics, it was not always possible to make such an issue-specific presentation. For this reason, each summary is largely a recapitulation of the major points made in the session, ordered to reflect the general flow of the discussions.

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### RESOURCE EXTRACTION SESSION

#### Introduction

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The discussion in the extraction session progressed through two phases. The first phase addressed issues pertaining to the scope and objectives of an Appalachian energy technology assessment. During the second phase, the discussion turned to the identification of tissues to be investigated during the course of such research.

#### Scope and Objectives

One contribution that a technology assessment of Appalachian energy development would provide is to document the formal and informal institutional arrangements underlying energy-related development. The formal institutional structure is provided by the laws and regulations that must be complied with in order to pursue energy activities. The informal structures are the unwritten rules and patterns of conduct that must be adhered to in day-to-day business, society and governmental operations.

The point was made that various laws and regulations specifiy the legal conditions and prerequisites that must be complied with in order to undertake energy-related activities. Every group, however, has also developed its own traditions and customs for adapting their operations to conform with these legal requirements. These methods reflect the specific priorities and constraints peculiar to the business, social and governmental relationships of each group. Therefore, an analysis of these written and unwritten laws would be valuable in understanding present Appalachian energy activities and in clarifying the points of controversy with respect to energy laws and regulations.

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Figure 1 was developed by the group to illustrate the complexity of the technological relationships involved in coal development activities. The diagram follows the main thread of production operations, from the identification of reserves, through exploration, and extraction, to the various technologies for preparing and cleaning raw coal so that it can be transported directly, or cleaned and then transported for use. Associated with this main thread are a set of supplementary operations supporting coal production activities. These may relate to subsidiary operations such as control or reprocessing of byproducts from selected production, cleaning, and transportation operations. Included also are business and community aspects, such as financing, taxation, and ownership, which permeate the whole production process.

The lines connecting the boxes represent a series of transactions that are required between groups involved in energy extraction in Appalachia. These transactions define the business, financial, regulatory, and community/environmental interactions that must come together for the success of or for an improvement in the coal production process.

Future research should seek to identify the nature of these relationships and, in particular, to analyze the effects on them of formal legal requirements and of informal requirements developed from ongoing practices and traditions. The interaction and conflict of formal and informal requirements should be examined in the research.

Three scenarios were suggested to provide a framework within which the interplay of technological environmental economic and social concerns can be examined. They are as follows:

1. A continuation of existing technology, regulations, and institutional realtionships, assuming no new extraction development in the region.
2. A continuation of existing technology, regulations, and institutional relationships, assuming increased levels of coal production.
3. Increased levels of environmental and economic regulation designed to meet existing air, water, and land use standards and to maintain the quality of life at an acceptable level.

These scenarios provide a method for drawing out and illustrating the relationship of various factors to specific issues under different assumptions as to the level of future coal development and the stingency of environmental and economic regulation of energy activities.

Each of the scenarios should include an evaluation of the following factors:

1. Mining productivity

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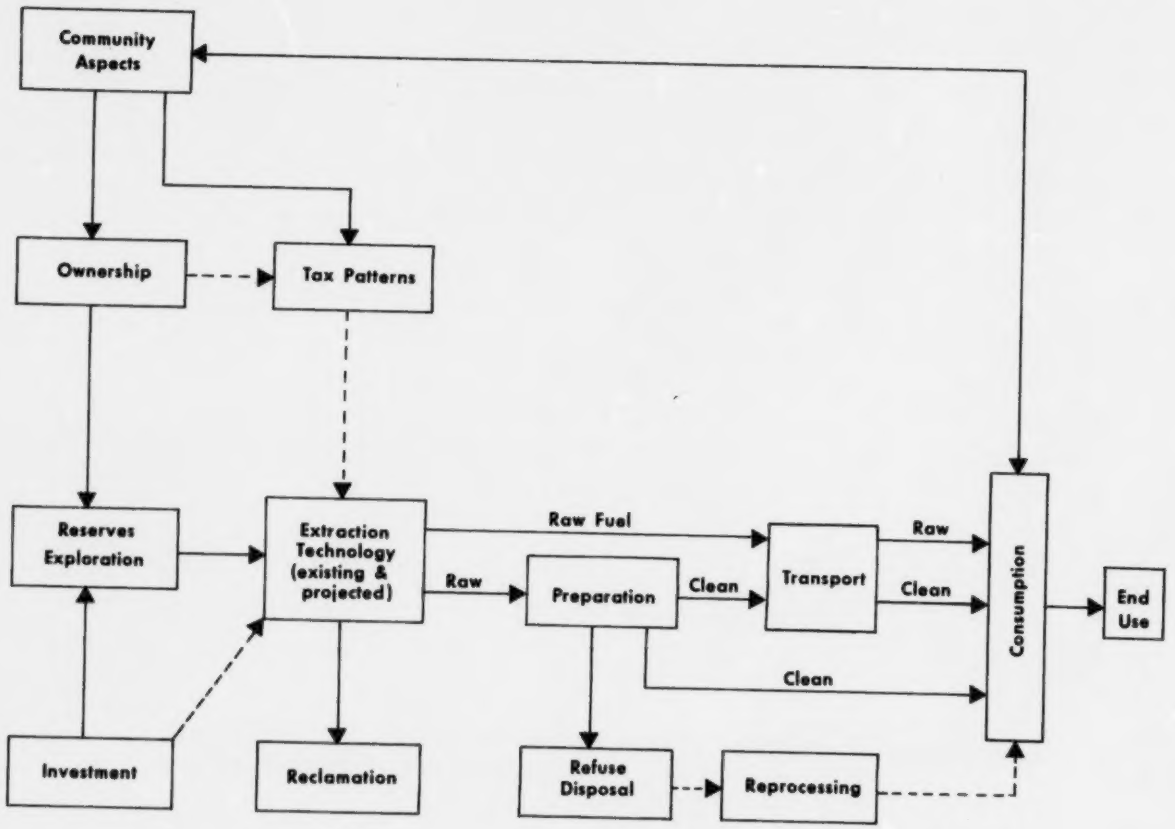
Community Aspects
Ownership
Tax Patterns
Reserves Exploration
Extraction Technology (existing & projected)
Investment
Reclamation
Raw Fuel
Raw
Preparation
Clean
Transport
Raw
Clean
Clean
Refuse Disposal
Reprocessing
Consumption
End Use

Figure 1. Flow chart of activities and materials involved in appalachian energy resources extraction.

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2. Costs
    a. Capital investments (including mine infrastructure)
    b. Operating costs (including transportation)
    c. Preparatory planning for development
    d. Monitoring environmental impacts of extraction
    e. Reclamation of land
3. Transportation facilities -- rail, barge, and truck
    a. Capacity
    b. Maintenance
4. Investment incentives
5. Rate of return on invested capital
6. Price of Appalachian coal relative to other fuels
7. Labor market
8. Availability and quality of usable water supplies for mining operations
9. Land use (including ownership patterns and the effects of differential tax rates)
10. Social infrastructure
    a. Housing
    b. Schools
    c. Hospitals
    d. Sewage treatment
    e. Potable water treatment and distribution
11. Mining technology
12. Mine safety
13. Environmental quality
    a. Air
    b. Water
    c. Reclamation
14. Health of the general population in mining areas

Issue Development

The remainder of the discussion centered around the regulatory environment and its associated impacts on coal extraction. It also concerned who will bear the economic burden of increased coal mining and the effects of increased coal mining on the quality of life in the mining areas. This leads to the development of specific questions that future research could examine. The following list highlights some of the major questions that resulted from the session:

- How do environmental regulations affect small coal mine operators?
- What is the affect of increased government regulation on the competition of coal with oil and gas?
- Will extraction technology improve substantially in the near future?
- What are the effects of current regulations on technological innovation?
- Would area wide environmental regulations be more effective than site-specific permiting?

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- o Who will assume the increased economic burdens on society of coal production?
- o How can quality-of-life issues achieve a larger role in the decision-making processes associated with coal extraction?

The discussion that led to the development of each of these questions is presented next.

OSM Regulatory Effects--

It was noted that the cost of mining coal was affected by increased regulation, including the Surface Mining Act. The possibility of small mine operators getting "bumped" out of coal production was seen as quite high by some and yet viewed with doubt by other members of the group. One view indicated that increasingly strict regulations, designed to improve environmental quality, could result in concentrating coal production in larger companies. There are two reasons for this. First of all, stricter regulations require added capital investments that small, marginal operations cannot afford. Secondly, the possibility of future changes in environmental regulations presents a risk to investment that can be hedged by a large capital base, such as one that a well established company could provide.

The allegation that small miners would not be put out of business by stricter regulations appeared to rest on the assumption that the strongly independent character of the individuals involved would lead them to resist selling out through one means or another. (An assumption of weak enforcement against numerous small companies may also have been implicit here.)

Effects of Increased Regulation--

It was suggested that future Appalachian energy research investigate the impact of the regulatory climate on captial availability for the coal industry. Uncertainty over environmental and energy regulations for the industry was felt to increase the riskiness and cost of financing new investment. The net expected effect was that of reducing investment in new capacity and to increase future energy prices.

Regulations also affect the use of particular grades of coal. The discussion pointed out that sulfur content and fly ash were both factors to be considered in utilizing coal. EPA limits the amounts of each that a coal-fired generation plant may emit. These limitations would affect any decision to buy coal.

Concern was expressed about Appalachian coal and its competitiveness with other coals from other regions and with other fuels. It was questioned whether or not Appalachian coal would be competitive while providing an adequate rate of return, given the expenditures required to produce, clean, transport, and burn it.

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Technological Improvements--

It was noted that the technology involved in coal mining, especially as it pertains to accidents, requires examination. Mention was made of mines in Europe utilizing single entries, whereas Federal regulations require operators to drive four or five entries on either side of their pillar work. It was also noted that Congress apparently is not satisfied that the technology to support single-entry work exists in the United States.

Some attendees felt that technological advancement has been limited by regulations in certain cases. It was pointed out that regulations are written with current technology in mind and that there is little encouragement to change the technology specified. In fact, penalties may result if changes are made. An examination of the availability of new technologies, or the fine-tuning of present ones, was suggested.

Mine safety in the United States, although improved, is still not on a par with that in European mines. The primary cause of injuries in British mines is stumbling, whereas in this country it is roof cave-ins. The question of whether there is a technological basis for the difference between European and U.S. coal mining safety performance is an area that could be usefully studied. An assessment of State and Federal mine safety regulations and the problems yet to be dealt with would provide a baseline for analysis. It could then be determined whether additional State or Federal legislation would be appropriate.

There was an opinion that States are closer to the people affected by regulations than are federal regulatory agenices. The resulting better communication between state agencies and the local people was felt to lead to more effective regulations. The other view was that legislation should be handled on the Federal level, with inputs from several sources including industry and the United Mine Workers of America (UMWA). The UMWA was felt by some to be an effective watchdog of miners' rights.

Duplication and contradictions between State and Federal regulations were also noted. Several states have literally duplicated the Coal Mine Health and Safety Act passed by Congress. In other cases, there have been direct contradictions between State and Federal regulations. For example, in West Virginia, the Federal mining inspectors did not want a berm used to control drainage, while the state inspectors did. Future research should examine and highlight such overlapping responsibilities, redundancies, and contradictions to provide an input for State and Federal regulatory bodies.

Examination of the Permitting Process--

Regulation of mining on a watershed or regional basis, rather than on a site-by-site basis, was discussed. It was suggested that methods for the coordinated control of several operations within the same watershed be studied in order to try to minimize environmental damage. Downstream and cumulative effects of mining operations also need to be examined to ensure that the permitting process provides adequate protection to the environment.

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In addition to the monetary costs generated by increased coal extraction, physical impacts on the environment and effects on the individual health and safety of both miners and area residents will also result. Disposal of wastes from strip mining and coal preparation represents a source of problems for area residents. It is also difficult to secure a loan to construct a house on reclaimed land, since it is not considered to have a stable enough subsurface.

Acid mine drainage and leachates from refuse piles degrade stream quality, affect potable water supplies, and damage agricultural land. In some instances, these effects are beyond the permitted area. Flooding in areas once deposited topsoil; now it deposits clay sediments and chemicals that damage agricultural growth. Flooding was felt to be aggravated by continued surface mining.

Increased Economic Burden--

The economic burdens created by increased coal extraction will have to be borne by someone. The question is, who? There will be impacts on the transportation system and social infrastructure in the coal producing regions of Appalachia. For example, the increased movement of coal on highways will increase maintenance costs. How will thes be financed? The trade-offs between the social costs and benefits of internalizing environmental and social costs of coal production (including those costs in the cost of mining and the price of using coal) and operating state and federal control programs (providing programs to mitigate the impacts) requires examination. Since any costs assessed directly to the coal producers would be passed to the purchasers, coal may become too expensive. If this happens, utilities and industry may turn to other fuels.

Some participants advanced the argument that because of coal's importance as a major regional resource and because of the economic predominance of the coal industry in many areas, coal companies should shoulder more responsibility for the social needs of the region. The responsibility applies not only to coal mining's direct effects upon the environment and coal communities, but also to the general quality-of-life for the region. A counter position mentioned was that for a private industry the generation of jobs and income is a sufficient contribution to the quality-of-life, and other social needs are the responsibility of society overall.

The question was also raised as to whether inter-fuel and intra-coal competition in the market place allows coal to assume more of a burden for the social needs of the region. Specifically, some parties cited the depressed coal market and problems of the industry in adjusting to changing environmental, economic, and fiscal requirements as evidence for their belief that the industry can bear little additional burden without threatening job and income gains. Others believe that it is economically viable for the coal industry to shoulder more of a responsibility for past and current environmental and social impacts of mining activity.

### Quality-of-Life Issues--

Increased coal production will require an increased labor pool that, in turn, will require additional housing and associated infrastructure. Two financial problems noted were the lack of land to develop, and the lack of financing for the infrastructure including water treatment and distribution systems, sewage collection and treatment systems, storm drains, pavement, police and fire protection, and school systems.

A land crunch in central Appalachia was noted. In one county in West Virginia, corporate land was condemned to make it available for housing. A suggestion was made to examine land ownership patterns. Land can be "held" in some areas--West Virginia, for example--at relatively low costs. This is done by speculators hoping for a profit. Another problem is that reclaimed land is difficult to develop because of its instability and possible methane seepage.

The shortage of land capable of supporting housing developments is also influenced by the lack of level land in the region, and by the constraints against building on floodplains. It was noted that current U.S. homebuilding techniques are designed for level land. A study of building techniques used in Sweden and Wales on mountainous terrain was suggested.

The infrastructure required to support communities is also a problem. In sewer construction, the Environmental Protection Agency (EPA) requires proof that a certain number of people need the system before the community will be eligible for Federal funding. The projected 20 to 30 percent increase in the West Virginian population requireing sanitary sewerage was not considered sufficient to justify Federal funding. Construction of water systems is another problem. A water line two miles long may pick up only 20 customers. This results in lengthy water systems serving relatively few customers. Because of the small number of customers bearing the costs of construction and of operation and maintenance, minimum bills for such small systems often are in the range of $20 to $30 a month. An illustration is a water system in one rural West Virginian county with a minimum bill of $45. It was also noted that there appears to be a bias against rural communities in Federal funding for the construction of community infrastructure and services.

Buckenshire, Virginia is an example of one possible solution. A mining company assisted in the development of this community. Plans were drawn up to provide housing that was compatible with the terrain and the local people. Home financing was guaranteed to up to 90 percent, and assistance with the required forms was provided. In this case, the company did not wish to own the community in contrast to the "company towns" that had been built in the past.

## CONVERSION FACILITY SESSION

The Energy Conversion Facility Session began with an introduction of each participant by name, organization, and focus of interest toward the

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subject of future energy development in Appalachia. The members of the assembled group represented private energy industry, utility companies, Federal and State agencies, and public interests.

The discussion began with an examination of the benefits and problems derived from the continued expansion of coal-fired electric generating facilities. Later in the session, the group turned to a discussion of the possible alternative energy sources available to the region, including gas, oil, biomass, solar, and wind.

While it was felt that all are viable alternative energy sources in Appalachia, the group participants agreed that any discussion of energy and Appalachia would be most productive by initially focusing on coal. It was anticipated by the workshop organizers that many of the issues arising in an initial examination of the technology involved with the coal-fired generation of electricity would be related to other energy technologies, for example synthetic fuel production. For this reason, discussion focused first upon these generating facilities. The benefits and debits resulting from the expansion of such coal-fired electric plants are presented as Tables 4 and 5, respectively. As a corollary, the group also developed a list of problems and constraints faced by those involved in facility development. This is presented as Table 6.

Each member of the group was then asked to choose three of the items listed as most important to the interests that he or she represented, and also to consider the choice of the item by weighing its relevance to future research on Appalachian energy development.

The choices made by the participants indicated that environmental regulations and facility siting were given a high priority. Public policies, defined as national and State policies toward energy development, were of particular concern to private industry. The participation of interest groups in policy and regulation formation was ranked high by government representatives.

Based on these results, the conversion facilities group was directed to a discussion of the following five factors and their implications to Appalachian energy activities:

1. Environmental impacts - air, health, water - and their regulation
2. Facility siting
3. Interest group participation
4. Public policies
5. Socioeconomic-cultural considerations

The outstanding points made with respect to these factors are discussed below.

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## TABLE 4. BENEFITS ASSOCIATED WITH EXPANDING COAL-FIRED ELECTRIC GENERATING FACILITIES

1. Jobs - those related to expansion of the resource and those indirectly related to it (including the actual uses of the resource).
2. Economic activity increase - enabling growth through capital investment, and energy availability and reliability.
3. Money concentrated in few hands - local control.
4. Maintain population - desirable living/work places give political stability to area.
5. Fuel substitutes for higher priority fuels - reduced dependence on scarcer fuels for industrial and individual consumption.
6. Less expensive - replacement for higher priority fuels such as oil and gas.
7. Maintenance of railroads - coal is a major source of their trade.
8. Opportunity for socio-cultural change - life-style improvements.

## TABLE 5. DEBITS ASSOCIATED WITH EXPANDING COAL-FIRED ELECTRIC GENERATING FACILITIES

1. Production of residues requiring disposal (including thermal).
2. Air pollution.
3. Water use and pollution.
4. Degradation of aesthetics.
5. Negative health effects.
6. Requirements for community services by workers.
7. Depletion of limited resources.
8. Highway destruction.
9. Negative socio-cultural changes.
10. Centralization of economic resources.

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### TABLE 6. PROBLEMS/CONSTRAINTS ASSOCIATED WITH EXPANSION OF COAL-FIRED ELECTRIC GENERATING FACILITIES

1. Electricity demand ("load") management - redistribution rather than expansion.
2. Facility siting - regulations, cost, and small plants for local generation and use.
3. Financing - taxation and capital investment.
4. Availability of fuel.
5. Public policies not yet available for coal.
6. Mining practices - regulation and strikes.
7. Interest group participation - lack of communication.
8. End use patterns - location may limit district heating through cogeneration.

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## Regulation of Environmental Impacts

A difficulty identified early in the discussion was the inconsistency of the Federal and State laws and regulations designed to control or limit the environmental impact of various industrial operations, including the generation of electrical power. These inconsistencies are amplified by Federal, State, regional, and local regulations, which are sometimes at variance with one another.

It was pointed out that by its Congressional mandate, has more limited flexibility in enforcing regulations than do many State agencies. For example, in Pennsylvania, the heat capacity of a facility's boilers was used to estimate the magnitude of potential particulate emissions. The State set a low value for the threshold above which facilities would have to show that they had adequate emission control. Yet, at the same time, the State enforced the application of emission control technology in a flexible manner by considering each plant on a case-by-case basis. The EPA is not allowed to consider plants individually (except under limited, well defined situations) and, therefore, a large number of facilities are being forced to apply emission controls that they feel are too strict.

The current means of determining how available increments will be used up under Prevention of Significant Deterioration (PSD) regulations was also felt to be too restrictive. Currently, portions of the increment are consumed on a first-come, first-served basis. This does not appear to be the best approach because it does not take a long-range view of the types of industrial development that might be best for a given area. An alternative approach, such as auctioning of available air pollution rights, might be more advantageous.

Present regulations also take too narrow a view of the extent to which energy facilities may affect the degree of air pollution since they tend to be very facility specific. Power available in Appalachia will attract industry, to one degree or another. The introduction of new industry, even though that new industry conforms to emission standards, may cause unanticipated secondary sources of pollutants. These could include increases in auto dust from dirt roads, vehicular emissions, and home heating emissions, all due to an influx of labor. These secondary source emissions, though not directly emanating from the power generating facility itself, could eventually require the installation of more expensive pollution equipment by the facility. The future growth of the facility may also be limited so as not to violate pollutant ceilings. Again, the impact of clean air regulations on the general economic development in Appalachia requires evaluation. For a state or area encouraging development of its economy, the possible impact becomes an important issue.

## Other Energy Development Impacts

It was agreed that extraction and use of coal would have direct health effects, but it was suggested that little research has been done to determine the physical and psychological reactions to the introduction of new, or

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the rapid expansion of present, technology within a community. Assessing the social impact of rapid technology change could be sufficiently investigated within an energy development assessment to suggest further attitudinal studies of the relationship between technology and society. By tracking attitudinal change in Appalachian communities, data could be developed to assist in evaluating the type and location of viable facility sites. Such data would also contribute to better understanding the extent to which various Appalachian communities desire different types of energy development.

The health problems associated with increased energy production and a parallel, reslutant increase in industrial development in Appalachia were brought out. These included respiratory effects of atmospheric pollutants and injuries from high-risk jobs. Acid rainfall resulting from sulfur dioxide emmissions and increased flooding resulting from mining were also mentioned and briefly discussed.

The group also considered the positive health benefits resulting from industrial development. The benefits stemmed from two related phenomea. First of all, the development of an organized facility, including additional housing for employees, brings with it an ability to provide water purification and distribution, sanitary sewers, hospitals, and other community benefits. The second benefit is the improved personal economic standard enjoyed in the area as a result of the facility's construction and operation. Such an improved standard allows the attainment of better nutrition and the provision of medical services on a family basis.

While the positive health benefits derived from development are considered to be an economic benefit, there may be health trade-offs between different energy conversion alternatives. Also the attainment and the distribution of health, as well as economic, benefits may well depend on institutional mechanisms or on means to assure equal access by the residents in an effected community.

The availability of water in sufficient quantity to support industrial needs is of interest. It was noted that such water supplies can only originate from major streams or artificial reservoirs. The movement of water from one drainage basin to another was not felt to be a major consideration in the region.

A study of the availability of sufficient water supplies for major energy development areas is being conducted by the Water Resources Council. Although such a study would be required to support various conversion facilities, it was also noted that a more comprehensive assessment is needed to consider all factors associated with siting decisions. Such factors would include sufficient transportation and waste disposal facilities among others. The feasibility of reservoir construction, and the possible constraints on it, would also have to be considered in relation to facility siting.

Finally, long-range transport of air pollutants was noted to have serious ecological and health consequences. Increased levels of sulfates and nitrates are being found in northern Appalachia and in the Northeast, and even in

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rural areas located far from major pollution sources. One result is that rainfall is increasingly acidic. This damages plants and trees and kills fish. In addition, human health is probably being jeopardized since it is now believed that sulfates are more harmful than their precursor, $SO_2$.

Interest Group Participation

Appalachia is a very diverse region topographically, as well as with respect to the social and economic structures found in the Regions' communities. Therefore, a development plan that could be implemented in one area may not be appropriate in another area and may even prove to be detrimental. A comprehensive assessment of Appalachia's energy future is one means of supplying decision-makers with an evaluation of how these factors will affect development, as well as of the different attitudes in the region and how those attitudes will affect future planning.

One example of the differing social attitudes is reflected in the degree to which "traditional identity" of Appalachians differs from the rest of the Nation, depending upon where in the Region they are located. Residents of rural areas are often more set in their life styles; more willing, for instance, to forgo the rapid pace and growth emphasis of the "outside world." On the other hand, more urban Appalachian areas are much more in the "mainsteam" of socio economic life. These differences mean that there will be a variety of reactions to proposed energy development, depending upon where it might occur in the Region.

During a discussion of attitudes within the Region, it was noted that until 20 or 25 years ago many Appalachian communities were dominated by a single family. In other cases, they were dominated by individual industries, such as coal companies. The role of the corporation in the local political structure has been a problem and is still a matter of suspicion and concern in local communities. The center of power of many industries frequently resides outside the region, and therefore, industry activities have been compared with those of multinational companies working in less developed countries. Local resistance to energy development in Appalachia sometimes occurs as a result of cultural fear of loss of traditional identity because of this outside intervention.

In order that these differing concerns be heard and weighed, mechanisms are needed to involve citizens and/or their local representatives in the energy development decision-making processes. Workshop participants particulary mentioned the need to improve involvement in community decisions and in those involving the immediate (i.e., multi-conuty) region around them. At this particular workshop State and National representation was not discussed at the same depth, presumeably reflecting either less concern or less hope of having an impact.

It was concluded that there are two important factors to be considered when developing a system that would provide for adequate representation of local officials and public interest groups. One factor is the structure of such a system; has a formal means been provided for representation on energy

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development decisions? The second factor is the responsiveness of that system; is it conscientiously utilized to provide communication in the decision-making process? Both must exist for effective citizen representation.

It was pointed out that new mechanisms are needed to involve the local community in decisions concerning the type of facility to be built within its jurisdiction, as well as the mode of operation of the facility. One suggestion was that energy company representatives should be physically present in the community to allow more understanding between management decision-makers and those living in the area who are affected by the decisions. Related to this was the suggestion that community members themselves be part of the facility decision-making structure or at least be allowed to be advisors to the decision-makers.

On the other hand, several reasons for limiting community involvement were noted. Firstly, if development policies are shaped by the communities, the result may be too unpredictable for industrial managements and they may choose to locate elsewhere. Secondly, existing constraints on community decision making, such as the existing local power structure, may make it difficult for the community to represent the citizenry even if it did have a say in how a business was to be run.

In examining representation on a broader geographic scale, it was noted that only a portion of Appalachia's Local Development Districts (LDD's) were organized to respond to energy development planning and some of these were not responsive to a broad range of citizen concerns. On the State and Federal decision-making level, mechanisms for public involvement exist, but are not necessarily providing the level of communication that some public interest groups desire.

Given the diversity of local political structures and of public goals that appears to exist in both the communities and in the Region, it was felt that the first step in studying local involvement in energy development was to characterize the range different community types. This would provide a base from which to analyse the effectiveness of alternative means of local involvement in the development of energy facilities. A similar approach would be used to investigate involvement on the LDD level. The involvement of the public and local officials in State and regional decisions through existing mechanisms should also be investigated and evaluated for their responsiveness. Alternative mechanisms should be identified and compared with existing ones.

All those involved in shaping Appalachia's energy future were concerned about the lack of information available to decision-makers. Industry, government, and public interest groups need a comprehensive and generally accepted base of information so that there is some common basis for discussion.

Providing adequate information at the local level would also be necessary to allow for knowledgeable involvement of a public that may soon have energy industries in its midst. Then the responsibility for development would not repose solely with a remote Federal or State judgement on industrial siting and technology development. Rather, the people affected positively or adversely would have a say in the future development in their area.

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Two different views on providing the needed information seemed to be present: "education" of the citizenry or just making the material readily available. Some felt that government and industry have the responsibility for educating the public; they perceived that the public's ability to organize and grasp technical information is low and, therefore, that the public needs some direction in these processes. It was noted, however, that special interests might be use such an "educational" approach to focus its attentions on groups that were more receptive to development and to emphasize the benefits at the expense of the associated problems and risks. The alternative is to provide unbiased information to a broad cross section of Appalachian citizens so that they can inform themselves and arrive at their own policy decisions. Then each group can make its own interests known based on a fairly good understanding of the facts and issues involved.

One method for promoting intergroup communication in Appalachia would be through demonstration projects. It was noted that demonstration projects are quite effective in involving people and proving that certain procedures are viable.

A dichotomy similar to that noted in the application of the education process appeared over how to use research findings concerning community willingness to accept energy facilities. Some felt that these results would be helpful in identifying areas of high energy development potential, thus allowing companies to bypass those localities where local opposition might impede "progress." Others pointed out that this was a pro-development attitude that did not account for the regional impacts of energy facilities (for example, highways, secondary industry, and air pollution) that would be of concern to those beyond community boundaries. They saw future research results as important tools for suggesting the mechanisms for public communication and for informing the public and local officials as to why the general citizenry either favored or resisted development.

It was agreed that any development that does occur must be designed to alleviate some of the Appalachian problems, such as poor housing and health. Benefits, disbenefits, and trade-offs must be presented in an understandable form to assist in the decision-making process. To this end, a cost accounting system was suggested as a way to measure what the impact resulting from the development of an energy conversion facility would be at various jurisdictional levels within the region. The effects of different developmental policies and institutional frameworks, for example tax mechanisms, could then be estimated. The accounting methods by which those costs are evaluated for these different scenarios should be consistent and credible so that a community could use them as a model to evaluate how specific development may add to or detract from the current lifestyle of the community. While quality-of-life questions are usually not considered quantifiable, the costs of health services, pollution control, and land-use planning could serve as an indicator to estimate such sociocultural factors.

Consideration of a broad range of options for future energy activities is required. Each conversion facility type will uniquely change not just a particular community, but the region in general. Therefore, the choice of alternative technologies or of alternatives to technological development is

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an issue. Not only should the Appalachian residents participate in examining the options, but also in deciding to what extent coal is to be used and where such use is to occur. In this case, choices include using coal in local conversion facilities to produce power, upgrading it locally to synthetic fuels, or exporting it directly to the rest of the country. Coal consumed within the Region could produce energy or manufactured products for export. Various mixes of these options are possible.

The rate of coal utilization must also be considered. Coal could be held in abeyance as an exploitable reserve resource while a mix of alternative fuels are used. Such fuels could include biomass, solar, or nuclear.

The variations between public policies at different levels of government were discussed. It was noted that the variations may limit, in some cases, citizen and private industry participation in decisionmaking. Policies were also in conflict with each other in certain areas. For example, the Federal policy is to use coal and generate power, but the Appalachian region and its member states may have no policy on the extent and/or type of energy export. Policy variations were noted in land use, eminent domain, and state implementation of federally-granted authority, for example, in environmental regulations. Such areas of inconsistency and conflict among policy at different government levels need to be identified and mechanisms for eliminating or at least reducing them need to be evaluated.

## Alternatives to Coal-Fired Technologies

The group next turned its attention to technologies other than coal-fired power plants. These included syn-fuel, nuclear, and other energy choices. It was agreed that many of the problems associated with coal-fired power plants had compliments when considering these alternative fuels and conversion systems. The group was asked to identify those problems that were both unique to other energy systems and important to Appalachia.

### Syn-Fuel--

Participants identified five synthetic fuel facility problem areas that are significant and differ from the concerns associated with coal-fired power plants. They were:

- Hydrocarbon emissions
- Institutional problems (siting, permitting, etc.)
- Efficiency in energy use (considering the total energy chain)
- Public attitudes
- Public policy effects on product transmission

Synthetic fuel plants have effects, both environmental and economic that are quantitatively different from those of fossil fuel power plants. However, in general, previous discussions regarding the impacts of coal-fired plants also pertain to synthetic fuel plants. Both types of facilities require large amounts of coal and water, are highly capital intensive, and are not

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labor intensive. Therefore, certain analyses of the impacts between syn-fuel and coal-fired electric plants during future research should be quite straightforward.

Major differences between may be found when comparing the siting and decision processes for syn-fuel and coal-fired plants. Such institutional variables as are involved in these areas. While the environmental impacts of a syn-fuel plant are likely to be local, there is a problem with the public perception of such plants-- symbolic of people's fears of a little-known technology. Retail price must be considered with syn-fuel plants. Unlike electricity, the gaseous and liquid end products will come under Federal regulation if transported through an interstate pipeline. Distance will also be a determinant in the use of syn-fuels. Both cost and efficiency of transport must be examined when estimating the market potential of the fuel produced.

The types of industrial development in conjunction with syn-fuel facilities also require evaluation. The size of the syn-fuel plant, and its resultant output, will have a great effect on determining such additional development. Therefore, various plant sizes and types should be examined to determine the optimum one for each area.

Nuclear--

One objective of an Appalachian energy assessment might be to compare the costs and benefits of coal development to those associated with nuclear development. Participants noted three problem areas of particular concern:

- Uranium transport and enrichment
- Radioactive waste transport
- Wastewater disposal

These problems are particularlly important in Appalachia since more radioactive materials are transported in Appalachia than in any other region of the United States. There are also the associated social problems resulting from the fear of radioactive contamination from the nuclear plants and nuclear waste. Finally, the economic tradeoffs arising from land use, water use, and the use of nuclear power, when other technology is available, must be considered.

Other Energy Choices--

Other sources of energy that could be important to Appalachia are:

- Cogeneration
- Biomass (by-products of paper pulping plants and silviculture residues)
- Low and high-head hydroelectric power (including pumped storage)
- Wind
- Solar (though meteorological conditions in Appalachia may make this unfavorable)
- Municipal waste
- Devonian shale
- Oil and gas

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Two main questions were raised during discussions of these other energy resources. First of all, in terms of energy development, what would the magnitude and distribution of costs and benefits for each be in relation to coal use? Secondly, how would the development of such alternatives affect the region's total energy production?

It was noted that the scope of possible development of all types of conversion facilities, the possible mixes of conversion technology, and the impact of both factors on the people and institutions of Appalachia must be considered to produce a proper assessment of these alternatives. Such information would be necessary for one to determine whether or not Appalachia should supply energy for areas outside its boundaries and how it would produce energy for its own consumption.

## Specific Research Problems

During the course of the Conversion Facility Session the participants were asked to try to reach a consensus on specific problems that an assessment of Appalachian energy development might address. Indeed, much of the discussion revolved around these problem statements. They are presented in Table 7.

## ENERGY END-USE SESSION

The Energy End-Use Session resulted in a group consensus such that one central issue area and four specific subareas represented the group's concerns. They are as follows:

A. Central issue: lack of a consistent national policy on fuel utilization

B. Specific issue subareas:

  - Communication among different levels of government (local, State, and Federal) and between governments and the public
  - Centralization vs. decentralization of power generation
  - Growth management and development
  - Technological applications

The group discussions are summarized in three parts: the range of viewpoints expressed, a summary of the viewpoints into five topical areas, and a set of questions for possible investigation in an assessment of Appalachian energy development.

## Range of Viewpoints Expressed

The following information represents the viewpoints expressed by the participants during the Energy End-Use session.

The development of energy production in Appalachia, as well as the increased utilization of Appalachian fuels, will be affected by the lack of consistent policies within the government and industrial sectors. Problems

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## TABLE 7. SOME SPECIFIC PROBLEMS TO BE ADDRESSED IN AN ASSESSMENT OF APPALACHIAN ENERGY DEVELOPMENT

1. What mechanisms exist for dealing with the long-range transport and cumulative effects of air pollution?
2. What will be the impact of air regulations on State and regional economic development? In particular, what tradeoffs must be considered when allocating air pollution increments for Prevention of Significant Deterioration (PSD)?
3. What effect would clear air regulations have on developing energy technology?
4. What are the net economic costs and benefits to various government jurisdictions that would result from establishment of different types of institutional frameworks to manage the development of energy facilities and their associated impacts?
5. What impact would the promotion of alternative energy sources (synthetic fuel, biomass, etc.) have on regional development?
6. What mechanisms exist, or could be created, to deal with the inconsistencies between State and Federal EPA air pollution control regulations?
7. How may the differing attitudes of Appalachian communities toward development affect the type and location of future growth?
8. What are the health tradeoffs associated with different energy conversion alternatives?
9. What mechanisms exist for community control of, or at least involvement in, the conversion facility siting process?
10. What will be the effects of different levels of energy production, as well as various energy conversion technology mixes, on the Appalachian Region?
11. What mechanisms exist for public participation in the siting and development of decision-making processes at both the State and multicounty levels?
12. What effects do differing policies at different levels of government have on energy development?

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were pointed out with cogeneration in the National Energy Plan, with the use of environmental impact statements (EIS) to halt or justify projects, and with the forecasting of energy demands and utility construction. Cogeneration was approved in both the House and Senate before being dropped because it would increase oil imports. No specific reasons were given at that time. It was felt that the impact of any shift in cogeneration policy on oil imports should be evaluated carefully during planning phases.

The EIS has been used by various groups to halt some projects, and by other groups to justify projects. The idea of evaluating the environmental impact of a project seems to have been pushed to the side. A sense of balance must be returned to the EIS and its use.

Problems with energy demand forecasts result from different methodologies, rapidly changing regulations, unpredictably changing fuel prices, and other factors. No one knows which forecast to accept, so each study does its own. The forecasts were also out of date before their publication. However, it was felt a centralized forecasting service would not be accepted. A forecast of national energy demand, though not necessarily done in a centralized agency, would be of value to Appalachia. Such a forecast would provide a basis for estimating the amount of energy Appalachia could possibly export to the rest of the nation.

The siting of power plants was pointed out to be very difficult because of the involved permitting procedures at various governmental levels. This causes long delays in construction and a reluctance on the part of utilities to expand generating facilities. A simultaneous permitting process would ease the complexities and shorten the time frame for plant siting. Pollution regulations also seem to be hindering industrial siting. This seemed to be especially true in mountainous regions like Appalachia where pollutant dispersal may be a problem.

Possible conflicts of interest were noted as problems in the Public Service Commissions and other regulatory bodies. Personnel seem to move back and forth between the regulating body and the industry being regulated. Others felt this movement was beneficial because of the complex nature of the utility industry and the problems involved with regulating it without strangling it.

The regulations concerning the reconversion to coal by industry were questioned. Some problems were identified where interstate friction could affect the Appalachian region. Each state may begin to place a greater emphasis on exploiting its own resources. This would help State economies but not necessarily the Appalachian Region.

Excess generating capacity and spinning reserves, and how much of them were desirable were also discussed. One opinion stated was that utility companies are keeping excessive capacity designed to meet peak loads. This results in higher than necessary utility rates. Others felt the excess capacity was necessary to meet some peak loads. The same statements were made regarding spinning reserves.

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The regulation of a utility's return on investment (ROI) was questioned. It was noted that as long as a utility does not connect to a grid its ROI is not limited. There is also little incentive for efficiency since the ROI is a straight percentage of the amount invested. Flexibility on earnings was a topic presented for consideration in future research.

In many instances the public has been left out of the regulation-making process completely. A knowledge of the purpose and goals of energy regulations and policies probably would eliminate some of the public's hostility toward regulations and the higher costs that result from them.

Bringing the public into the planning process for regulations and other decisions was suggested. This would extend the planning period, but the benefits were thought to be worthwhile. Such a plan could help to mitigate the delays caused by protests and injunctions instigated by groups formerly left out of the planning process.

Communication within and between various government levels was felt to be lacking. Often State regulations were at odds with Federal standards. Local zoning further complicated the issue in some cases. Standardization would be a great benefit to industry planners in making siting and growth decisions.

Public officials were poorly informed on some of the issues they were dealing with. Better informed officials result in decisions based on more complete and accurate information. A better informed public might also understand the need for higher utility rates in some cases, for example, where scrubber installation is necessary for better pollution control. Better understanding might eliminate protest at every rate increase and focus attention on the unjustified ones.

State plans in Georgia and Minnesota for public involvement were discussed in general.

Attaching estimated prices to proposed decisions would also increase the public's awareness. Social costs (for example, medical complications resulting from increased pollution and environmental degradation), as well as benefits, should be made known. Residents of areas promoting industrial growth would have more information on which to base the decision of whether or not to support such growth.

The relationship of the press to public opinion was discussed. It was questioned whether the press reported public opinion or created it.

The point of centralization or decentralization was discussed. The decision would rest partially on whether energy or products were to be exported from the Region. Fuel selection would also be a factor in the decision. Nuclear facilities would lend themselves to centralization, while coal, biomass, and solar could be decentralized.

The increase of energy production and industrial growth in Appalachia will require additional facilities, including transportation. It was pointed

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out that such growth would require direction. A coordinated regional growth management plan was suggested. Such growth planning or management would be facilitated by deciding whether to export energy, finished products, or some mix of the two. Transportation facilities would also require upgrading to support the increased movement of coal, raw materials, finished products, and personnel. A slurry pipeline was suggested to move the coal. Gasification and subsequent movement through conventional pipelines was also suggested.

Complete internalization of the costs related to utilization of coal, whether in or out of the Region, was mentioned. Some felt current regulations would achieve this and others disagreed. Another option was a Federal tax on coal to cover highway construction and maintenance costs. The amount of damage done with present haulage rates was cited. Increasing the tonnage moved would increase the road maintenance costs.

A change in the public's attitudes toward the automobile will be required to help cut energy growth in the United States. One view was that the economics of two dollar-a-gallon gasoline would take care of the problem. Detroit was felt by some to build pretty much what people wanted; those disagreeing pointed out that millions of imported automobiles enter the United States every year.

Incentives were thought to be required for any increase in industry in Appalachia. The Fuel Use Act was cited as one constraint to utility expansion. No one knows how lax or stringent the Act will be. Major utilities lack the information to commit to new major generation. A resolution of the amorphous policy situation regarding fuels would aid in making such commitments.

The use of public investments to develop pollution control equipment was brought up. The necessity of re-examining research priorities in the pollution control and energy conservation areas was also stated. The consideration of technological applications in the area of coal utilization was felt to be a number one priority in any Appalachian Regional Commission (ARC) program.

## Summary of Viewpoints

The foregoing viewpoints were felt to merge into the following five general topics. These topics are summarized in a single paragraph at the end of this section.

Lack of a National Fuel Utilization Policy--

A consistent national policy on fuel utilization is essential to assessing energy growth. Such a policy would provide a consistent framework within which to make decisions regarding energy development. Modification of the current fuel and energy regulations may or may not be possible, but they must be examined to determine the climate in which growth would occur. It is especially important to examine these regulations with respect to Appalachian energy production and use in general and to coal in particular. Is reconversion to coal to become a reality? Will the environmental restrictions on power plant emissions relax or tighten? Will nuclear power be developed on a large scale with minimal hazardous waste problems? All of these questions and many more are influenced by the complicated, and often conflicting, regulations and policies govering fuel utilization and energy production.

Communication--

One of the major factors resulting in conflicting regulations and programs is the lack of communication and cooperation between various levels of governments (local, State, and Federal). Such communication is also lacking among the various departments of government at each level. Thus the states may set standards or have policies that are inconsistent with Federal ones. Or one Federal department may be pushing for increased coal utilization, while another is limiting power plant emissions, thereby limiting coal utilization as a result of economic constraints.

Communication with the private sector is also limited in many respects. This can cause long delays as private interest groups who were not heard during the planning phase make their views known in lawsuits and court injunctions. Better communication channels in both of these areas would assist in minimizing such problems.

Centralization/Decentralization--

When the question of choice of fuels to generate energy is evaluated, the issue of whether to centralize or decentralize generating facilities arises. Centralization would lend itself to exporting energy. Decentralization would lend itself to local development in which the generating facilities would focus around the load centers. This could lend to building up industries which would then export upgraded products from the region. The availability and economics of alternative fuel types would have an important effect on the centralization/decentralization issue.

Implementing centralization, decentralization, or some mix of the two will require a program of growth management to effectively guide the plan for changes in local and regional growth patterns. Growth management in Appalachia will include promotion of the growth of industry and of the population. It will also necessitate the management of expansion not resulting from government or ARC programs.

Any increase of Appalachian industry or population will require additional transportation facilities. It will be necessary to move raw materials, fuel, employees, equipment, finished products, and other material necessary for industrial growth.

Growth Management--

A comprehensive growth management plan, including transportation, would eliminate much wasted motion and could be used as a means to involve the private sector of Appalachia.

Technical Applications--

An important area to be considered is the technological applications used to accomplish the foregoing plans. This would especially include pollution control technology. Here is a unique opportunity to construct

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utilities and industries from the "ground up" and not to be faced with modifying existing facilities. A logical presentation of the technological alternatives available to accomplish growth will be a necessity.

An assessment of the current research and development programs and their future direction will also be required. This would certainly aid in predicting or developing growth in Appalachia. Some of the R & D efforts may even be redirected to assist in solving problems highlighted by the proposed assessment.

Summary--

In summary a stable framework of regulations and policies is required to promote and guide growth in Appalachia. The public and private sectors must interact and communicate within themselves and with each other to minimize wasted activities. Growth must be managed in a logical manner from a regional as well as a local viewpoint. Technology must be utilized in the most efficient manner to accomplish the growth planned. This must include R & D efforts in areas specifically affecting Appalachia and the utilities and industries being encouraged to expand there.

## Questions

Four questions that represent the thrust of the end-use session were developed. They should be addressed in the course of an assessment of Appalachia's energy future. The questions are:

- What are the alternative procedures for communication among the various levels of local, State, and Federal governments; within those government levels; and between those government levels and the Appalachian private and public sectors?
- Would the energy development goals of the Appalachian Regional Commission be best served by centralization or decentralization of generating facilities or some combination of the two strategies?
- By what mechanism will growth management in Appalachia, including transportation, be accomplished?
- Can technological applications, especially research and development priorities in the areas of conservation and control devices as they apply in Appalachia, be examined?

## SECTION 4

## SUMMARY OF THE MAJOR ISSUES THAT PERVADED THE WORKSHOP DISCUSSIONS

There were issues that appeared to dominate the workshop. Some, such as making regulations more effective and efficient, were explicitly stated. Others were never directly enunciated, but were evident from a number of more narrow issues that were discussed. The question of how the burdens and benefits of energy development should be distributed was such an implied issue.

This section represents an attempt to draw the numerous topics discussed at the workshop into a more finite collection of major, though more general, issues that appear to surround Appalachian energy development. Besides highlighting these issues for the reader, such a condensation provides a focus for future research on Appalachia.* In addition, it is the first step in identifying other more narrow issues that for lack of time, may not have been raised in the two-day workshop.

The four issues that appeared to underlie much of the two days of discussions are:

1. What are the most important factors to consider when formulating future policies on Appalachian energy development?
2. How should the burdens and benefits of energy development in Appalachia be distributed?

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*A knowledge of the issues will help to focus research, but that does not mean that research will or even can, resolve the issues. Issues exist amongst people because of differing priorities (for example, as to who "should" be "responsible for cleaning up the environment"). Researchers need to know what the issues are so they can start to focus their research efforts on areas that are important to affected by energy development. Research can then try to clarify the physical and social factors that influence an issue, and can suggest alternatives for responding to an issue. But it is left up to the decisionmaker to ultimately chose what actions to take. Therefore the reader should not construe the first three issues listed in this section to be statements of problems that further research will "solve." The fourth issue must be resolved before research can begin. Even in this case, not everyone is expected to agree on the choice (of research) that is made.

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3. How can the effectiveness of environmental regulations which govern energy development be improved, while restraining the cost of their implementation?

4. What should be the principal objectives of an Appalachian energy technology assessment?

The issues are presented in a common format in this section. First of all, the issue statement is made, and then an attempt is made to clarify the issue by discussing why different interest groups feel it has arisen, why it is important to them, and what they think ought to be done about the issue. In the case of the first three issues, discussions are presented on how participants felt future research might contribute to a better understanding of the factors underlying the issue and of the alternatives for resolving it.

For the fourth issue we look more generally at the question of what an Appalachian energy development study might try to accomplish. Here the concerns that participants had about a regional energy assessment -- what its prupose, scope, and time frame should be and what audiences it should be responsive to -- are more comprehensively addressed.

## ISSUE 1 - WHAT ARE THE MOST IMPORTANT FACTORS TO CONSIDER WHEN FORMULATING FUTURE POLICIES ON APPALACHIAN ENERGY DEVELOPMENT?

The policies that determine Appalachia's future, including those directing future energy activities, cannot be developed in a vacuum. The Region's energy growth will be affected by national goals of energy self-sufficiency, environmental quality, a minimum standard of living, and the like. Similar goals within Appalachia itself must also be considered as numerous government bodies go about the task of developing energy development goals and policies which impact the Region. In what follows, the specific concerns of the participants on the need to take an integrated view in energy policy formulation are presented, along with some contributions that they felt an Appalachian energy assessment could make to the policy analysis process.

### Concerns of the Interest Groups

A. Determination of Energy Policies in Context of Other Regional Goals --
The Region has a number of energy alternatives available to it, even if emphasis is primarily placed on utilizing its most abundant resource--coal. It was evident from the many workshop discussions that several non-energy objectives need to be considered when determining which combination of these alternatives might be most appropriate. The three major (and interrelated) factors that were discussed were:

1. Quality of life improvement
2. Maintenance and improvement of environmental quality
3. Maintenance of economic growth

(No relative level of significance between the three factors is to be implied by their order of presentation.)

1. Improved quality of life--The goal of improved "quality of life" in the Region was espoused by all in the workshop. However, the term "quality of life" appears to incorporate a number of values, and different emphasis was placed on these values by those present. In the extraction session, reference was frequently made to job safety and the need to improve safety conditions during the process of technology development. Healthful living conditions for workers and the community at large were discussed in both the extraction and conversion sessions, as were the desires to have jobs available and to live a materially comfortable life-style. A number of participants also expressed the hope that the self-determination and self-sufficiency that is important to many Appalachians not be smothered by expanding energy activities. Examples cited for such self-determination included the ability to maintain small, "family-owned" coal mining operations, to own one's home, and to be able to buy land. (Land ownership is presently restricted because land ownership companies control so much of it.)

There was some realization that these qualities of a "decent life" were not all complimentary; some would likely have to be compromised if others were to be obtained. The maintenance of aesthetically pleasing surroundings may have to be foregone if jobs are to be provided. On the other hand, good

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wages are not a substitute for unsafe working conditions or for polluted drinking water and flooding. Similarly, it was felt that the maintenance of small mining firms was important for some, even if such operations are less efficient producers of coal and are more detrimental to the environment.

For many, maintenance of a good quality of life and of energy-related jobs go hand in hand, though the perspective on the relative importance of each varies. Some pointed out that good quality of life led to a more satisfied labor force and concluded that industry should therefore take more steps to improve general community conditions. From another point of view, it was argued that there was a maximum amount of community social support that could be provided. Above that, maximum industrial activity becomes unprofitable, either because product prices must be raised to an uncompetitive level or the project margin falls to low. In either case the number of job positions decreases, and quality of life in the community suffers from higher unemployment. While those present appeared to agree that this gap between expections placed on industry for community support and outlays that industry can make is narrowing, the difference is still wide enough to result in disagreement about how that gap could, and whether it should, be reduced further.

Finally, it was the opinion of some that there was a need to consider how the quality of life would be altered under different types and rates of future energy development. The extent to which Appalachia is an energy exporting region will affect the rate of expansion of energy activities and thus their impacts on the quality of life. Similarly, different types of energy extraction and conversion technologies and different types of energy consuming industries have dissimilar impacts on the environment, on the number of jobs, on the wage scale, and other factors. Therefore, the mix of technologies to be developed has an important influence on what life will be like for Appalachia in the future.

2. Maintenance and improvement of environmental quality--Appalachia has long been faced with environmental problems associated with its energy production, many of which are aggravated by the Region's topography. In the eyes of some participants, some major problems still have not been adequately taken care of and new ones are being realized. Manitenance of water qulaity during the extraction and benefication of coal is one example. While acid mine drainage from operating mines is being fairly well controlled, there are still considerable quantities of pollution from abandoned mines with no adequate means of decreasing such effluents in evidence.

Pollution from surface mines and mine refuse piles is also affecting water quality and contributing to flooding through sediment loading of streams. Some felt that inadequate consideration of water quality controls and monitoring beyond the mine site boundaries contributed to this. For instance, offsite pollution resulting from haulage roads contributes to water pollution. It was suggested that a watershed-oriented approach to the evaluation and control of mining impacts should be used. It might even be more cost-effective to restrict mining development to particular watersheds at any given time since this would allow for comprehensive and coordinated water quality control.

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Increased production and more stringent environmental regulations are causing additional pollution problems due to wastes from the pollution control processes. Coal cleaning produces solid wastes that must be disposed of, as do many types of air pollution control equipment. It was suggested that recirculating control processes and new means of utilizing solid wastes should be developed to reduce the impacts of pollution control technologies.

Long-range (hundreds of kilometers) transport of air pollutants is another subject of increasing concern. Acid rain formed from airborne sulfates and nitrates affects crops and pollutes surface water at large distances from the pollutants' source. The accumulation of air pollutants from numerous sources is causing higher levels of $SO_2$ concentrations than would be found from any one source. This, in turn, results in increased acidity of precipitation in Northern Appalachia.

Several implications relating environmental problems and energy policy were noted. One is the need for more regional development to handle the cumulative impacts of water and air pollution. Another is the need to seek out technologies that are not inherently polluting in the first place and that incorporate processes that minimize the use of such scarce resources as water (for example, through recycling and dry cooling). Finally, the economic benefits of producing energy in the region or, in an even more restrictive sense, of simply extracting fuel from the region need to be weighed against the environmental consequences. Such a consideration may lead to a decision not to exploit these resources at the maximum technologically or economically possible rate.

3. Maintenance of economic growth--Economic growth is a prime goal for many in Appalachia. The region has gone through cycles of extreme poverty and relative prosperity in the past. Not only is there a desire to minimize these cycles, but also to increase the level of economic well-being of Appalachians with respect to that of the rest of the nation.

Many of the workshop participants felt that expanded energy resource activities were an important, and for some a necessary, ingredient to economic growth. The energy industry has been a principle employer in the past and is expected to continue to be so in the future. They pointed out that despite attempts over the past two decades to diversify the Region's economy, this dependence on energy production remains.

Other participants felt that efforts should be continued to find alternatives to extracting and shipping fuel or power from the area that would still maintain economic growth. Some suggested a push to increase manufacturing in Appalachia using the regions energy resources as fuel. Others urged that industries be brought in which used "cleaner" energy resources. Finally still others suggested shifting to much less energy-intensive industries such as recreation or assembly-line fabrication.

The workshop discussions made it quite evident that there were conflicts among energy and non-energy goals. A full airing of the tradeoffs associated with different energy features for the Region is needed as part of any plan-

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ning process. Ultimately, decisions on how to balance these tradeoffs will have an impact upon the rate at which energy activities are expanded in Appalachia and the types of fuel resources and technologies that are encouraged.

### B. Re-evaluation of National Energy-Related Policies --

Besides determining Appalachian energy policies within the context of other goals for the Region future energy activities in Appalachia will have to compliment the energy policies of the nation. The lack of clearcut, integrated national policies on energy and such energy related areas as environmental protection, commerce, and social welfare are hampering decision making within Appalachia.

There is a lack of consistency in policies affecting energy activities among various federal agencies. For example, the seeming contradiction in the national goals of energy self-sufficiency and environmental protection. Some participants felt that if energy self-sufficiency was to be obtained without significantly curtailing the growth of free enterprise, we could not expect to necessarily be able to maintain environmental quality at the presently desired levels. Another view was that environmental quality need not be comprised but could be achieved along with energy independence if more emphasis was placed on energy conservation and the development of those renewable resources that are cleaner (for example solar energy). This option may exist, yet in the eyes of some there have been insufficient government incentives to stimulate the development of these alternatives.

There is also uncertainty about future changes in national energy policy. Energy industries are planning cautiously and are reluctant to develop new technologies. Because of the major impacts that some changes could have on their economic viability. The long lead times required in conversion facility construction and mine development increase the likelihood that changes in regulations or court challenges might wipe out the profitability of a marginal investment. The same could occur if changes in government policy shifted the relative market demand for a fuel.

The nation presently stands at a junction where some major decisions are required on the type of energy resources to be developed and on how other national goals, for example, environmental protection are to complement energy development. These decisions may significantly change the type and rate of Appalachian energy development. There appears to be the feeling that such decisions need to be made in the near future so that those involved in Appalachian energy can "get on with their business" with more certainty about what the national energy priorities.

### C. Continuing Involvement of Different Sectors of Society in Goal Setting--

The need for increased communication about energy development was raised repeatedly during the workshop and is implicit in the preceding discussions of energy and non-energy goal setting. Both the energy industries and the general public feel that they are not sufficiently involved in government decisions and that this is adversely affecting their interests. In terms of the relationship between business and the community, it was felt by some that citizens should have a greater say in how and where energy operations are carried out.

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Three considerations appeared to be most important in deciding how to improve communications. One was opening or expanding communication channels. This might involve such mechanisms as the formation of energy advisory panels containing a broad spectrum of representatives who would serve as advisers in the development of legislation and in government agency or business policy setting.

The second consideration was making existing communication channels more responsive to the interests that they were set up to serve. In other words, a review of the purpose and effectiveness of existing mechanisms for interest group involvement is needed.

Finally, some compendiums of information on Appalachian energy activities are needed. These would provide a commonly available set of technical data. Even if there was disagreement about the validity of some parts of such a set of comprehensive documents, they would at least be a starting point for discussions and would reduce the disadvantage of those groups lacking the resources to fund their own studies.

### Identified Study Needs

To allow the energy decision-making process to take into account Appalachian and national goals and how they affect Appalachian energy activities, there are a number of information needs that participants felt future studies of Appalachia could provide. They are summarized here.

- Identify the sectors of society that might be involved in energy development and identify the concerns, values, and priorities of the various interest groups in order to understand their goals. Determine how these groups presently interact where they desire more involvement, and how that involvement might be facilitated.
- Involve the interest groups in any study from its beginning in order to include their concerns and viewpoints.
- Develop a common base of information so that various interest groups can assess the possible avenues of development and their consequences, can decide which they favor, and can plan for their implementation.
- Investigate how different energy development alternatives will affect other goals (for example, environmental and economic) for Appalachia. Determine what opportunities will be lost to the region as a result of choosing any particular type of future energy activities. Identify how energy development might occur to best aid in the accomplishment of these goals.
- Identify non-energy goals and constraints that will be placed on future energy activities and determine the nature of their effects on implementing energy policy.

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- o Identify future demands for Appalachian power and fuel, both outside and within Appalachia.
- o Determine the effects that different national energy policies and non-energy policies will have on Appalachian energy activities.

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## ISSUE 2 - HOW SHOULD THE BURDENS AND BENEFITS OF ENERGY DEVELOPMENT IN APPALACHIA BE DISTRIBUTED?

Issue 1 concerned the process of planning for Appalachia's future. The present issue reflects a major concern for considering the tradeoffs that are inherent in working towards whatever goals society chooses. The uses of finite resources must be determined with an understanding of the future opportunities that may be lost. Similarly, while the Region's inhabitants are likely to obtain many benefits from expanded energy production, rapid development may result in some losses in such forms as the degredation of the natural environment and the short-term reduction in quality of social services. Workshop participants sited the need to better understand these tradeoffs and to develop approaches to measuring them and to managing change so that the results are controlled for the benefit of society. These concerns are expressed in more detail below.

### Concerns of the Interest Groups

Distribution of Costs--

Several concerns were raised relative to the distribution of the indirect various costs, both financial and nonfinancial, of energy development in Appalachia. The main question was whether industries should be forced to internalize the costs of environmental protection, thus passing the costs onto the consumer, or whether those costs should be borne by society in general by government subsidization of such things as pollution control. Some felt that if increased financial support for environmental protection and social welfare improvements were required, an energy industry's competitiveness would be decreased by internalizing them. To them some form of direct government subsidy seemed preferable because the industry was benefiting not only the immediately surrounding society by supplying jobs and spurring economic growth, but it was supplying a primary product to the nation as a whole.

Others favored internalizing costs by industry, thus placing the burden on users of the product. The problem noted here is this might put Appalachian industry at a market disadvantage with respect to other energy-producing regions. This disadvantage results from the environmental costs that result from the Region's topography. Topography also scatters population centers and decreases their average size, making social services more costly.

National subsidization of environmental protection, social services, and so on appeared to be the most acceptable form of answering: Who should bear the costs? Besides the reasons sited above for industry's reluctance to pay, subsidization from state or county *general* tax funds appeared unacceptable because of an additional burden which would be placed on the populations that the revenues were intended to help.

Still, there were those who were unconvinced that industry could not pay. They cited past cases where industry had scrimped on its responsibilities, providing inadequate work safety, substandard housing, and a poor health environment. To them the contention that some industries had tried harder than others to alleviate these ills and faced an economic risk in doing so did not appear to be a completely convincing argument for shifting some of the burdens onto the general population.

Resource allocation--

Much of Appalachia's energy demand is from outside the Region, and this external market is expected to grow in the future as the nation's demand for coal and coal-derived fuels increases and as the gross national product expands. Yet, Appalachia's fossil energy supply is finite. Some participants felt that the extent to which Appalachia would be called upon to supply external demands should be identified. Others believed that one should also examine how much raw fuel or power the Region wants to export in the future.

Several reasons exist for wanting to know how high future demand might be. From this one can determine whether present technologies will be adequate to meet the demand. Should, for instance, railroads go ahead and invest in new cars with the expectation that they will be fully utilized over a long amortization period--typically twenty years? One can also determine what magnitudes of social and environmental impacts may befall the Region and start to plan accordingly. Should a sustained coal boom not be anticipated, alternatives for economic growth can be analyzed.

On the other hand, some participants wanted to investigate the consequences of choosing not to meet all the demands for Appalachian resources. They noted that the boom-bust cycle had not been favorable for Appalachia in the past. It might be better this time to use the Region's resources to fuel other industries that would provide a possibly cleaner and healthier form of livelihood for the residents over a longer time period. A more constrained approach to resource extraction might also reduce the loss of future opportunities for the Region, such as loss of its recreational values as a result of strip mining or heavy foresting (for biomass-produced energy).

In short, Appalachia can export fuel, generate power, or use its energy resources to upgrade other raw materials, and for manufacturing. The tradeoffs associated with selecting a single alternative or mix of alternatives need to be determined.

Managing Growth--

The principal points made about the continuing process of growth management were that all interest groups needed to be involved and that tools for making decisions in growth planning are needed.

As in the case of determining what the goals for the Region should be, better communication and participation is needed in the "day-by-day" decisions that must be faced as growth and change continue. Some felt that more public involvement is needed in planning how energy facilities should be incorporated into a community and even in the ongoing management of the facilities. This would better insure that the needs of the community as well as the industry were being met.

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Another, more regional issue, concerned whether to centralize or decentralize facility development. Centralization could foster more industrial growth in the surrounding community, but would also result in denser population distributions with their associated high environmental impacts and social service demands. Decentralized growth would have opposite effects.

Looking at the question of centralization versus decentralization on a national scale, one can relate the two to export of power from certain regions of the country, for example, Appalachia, versus production of power for just local needs. The choice requires a broader geographic representation. Long-range growth management is needed because environmental impacts and interconnecting economic relationships will be affected by the amount of energy that the Region decides to produce, no matter whether what the size of the facilities are or whether they are located in close proximity or scattered over a wide area.

One particular example of a decision-making tool for growth management was discussed at length in the conversion session group. This was a model to be used at the sub-state level for determining the relative trade-offs resulting from different institutional arrangements for handling growth. It was specifically suggested that an econometric model, for comparing different municipal, county, and State financial structures and the financial transactions between these jurisdictions, would be useful. This might allow governments to determine what kind of institutions (for example, taxing procedures and State loan procedures) might best minimize the financial burdens experienced by locals when rapid development of energy industries occurs in their area.

## Identified Study Needs

The following points were identified as potential topics to be addressed in future research:

- The costs, risks, and benefits of different types and rates of energy development and growth management to the various interest groups needs to be determined.
- Models should be developed for examining the consequences and viability of the different institutional arrangements available for managing growth and growth impacts. The conclusions drawn from application of such models could be used by governments to develop appropriate institutions to provide growth management.

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## ISSUE 3 - HOW CAN THE EFFECTIVENESS OF ENVIRONMENTAL REGULATIONS WHICH GOVERN ENERGY DEVELOPMENT BE IMPROVED, WHILE RESTRAINING THE COST OF THEIR IMPLEMENTATION?

### Concerns of the Interest Groups

There seemed to be no contention with the fact that regulations in some form were needed to insure that the various interests operating in Appalachia meet their "social responsibilities." In fact, much had already been achieved through existing regulations. However, there was considerable discussion about the extent to which regulations were needed, their effectiveness and their social, as well as economic, costs.

Regulations constrain the actions of energy corporations and Appalachians, in general, or they require them to take additional steps in the process of carrying out their primary functions. In this way regulations have probably contributed significantly to fostering a number of the problems that the region faces. Technology innovation in mining and energy production has declined and the growth rate of the energy industry as a whole has decreased. Utilities are facing delays in bringing facilities on line, and the number of small, privately owned mines is decreasing.

While these problems are being experienced throughout the nation, it was felt that Appalachia was often at a particular disadvantage. This is because the cost of complying with a regulation is dependent upon a number of factors that determine the magnitude of the impacts (environmental, social, economic, and others) that a regulation is intended to reduce. Appalachia, with its often rough terrain, poor economic conditions, and dispersed population, is both working with a smaller margin of profit to start with and faced with higher expenses to come into compliance. Some workshop participants felt that more consideration should be given to making regulations flexible enough so that their cost/benefit ratio would be considered in deciding the extent of their implementation.

On the other hand, it was pointed out that uniform Federal regulations have served the purpose of equalizing the regional costs of pollution control in energy production by setting minimum standards for all to follow. This has reduced the economic advantages found in some states that were lax in such areas as environmental protection. An example would be the recent Federal strip mining regulations that while not as strict in some respects as those existing in Pennsylvania, are more demanding than past requirements in West Virginia and Kentucky.

Still, some participants felt that existing regulations do not respond to all the problems created in Appalachia by energy development. Long-range transport of air pollutants is causing increased acid precipitation in areas far removed from major sources of pollutants. Cumulative impacts of several mines within the same watershed still contribute to instances of flooding. Air pollution regulations do not account for pollution resulting from secondary growth that accompanies energy development, such as increased

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auto emissions and particulates from unpaved roads. In these cases, the causes for continuing problems need to be explored and means developed for alleviating them including, where appropriate, further regulatory control.

Jurisdictional overlaps exist that result in duplicity and sometimes contradictory interpretation and enforcement of regulations. For instance, utilities have often complained that the EPA and its state counterparts do not interpret regulations in the same way, thus leading to non-uniform enforcement, such as in the case of enforcing emission limitations under the Clean Air Act. It was suggested by others that not only would inconsistencies be avoided, but the states could save a large amount of dollars and manpower by not trying to duplicate Federal regulator activities such as in strip mine environmental control. The feeling was that states inadvisably wanted to be equally involved in order to prevent the Federal government from usurping their authority. The alternative was for the states to let the Federal government handle the improvement of job-related health and safety while they spent their efforts on improving job productivity and community welfare -- concerns that are unique to their jurisdiction.

Regulations are often seen to be too inflexible, particularly in their technological bias. They are frequently based on the engineering capabilities available at the time they are written, thus hampering future technological innovation. In short, they are oriented toward a particular technology instead of a particular benefit. This not only stifles technological innovation that might improve operating efficiencies, but it often makes it harder to introduce new practices for achieving the very benefits that are sought through the regulation.

Some felt that this technical bias should be dropped in favor of more goal-oriented regulations that provide flexibility for how the goal is achieved. However, others stated that industry has often not shown good faith when given the chance to operate under flexible regulations. Even today, some feel that many energy companies are sidestepping environmental protection, when they can, in favor of greater profits.

Another concern was that the present permitting processes for energy facilities are not working effectively. The multi-stepped process for obtaining permits results in costly lengthening of the facility development process and increased uncertainties about acceptability of the facility. Both lead to increased costs to energy industries. From the non-energy interest group's perspective, the multi-step process provides the time and opportunity for them to organize and present their objections to the facility. However, these special interest groups still do not feel that the process is always responsive to their concerns; in some cases, it may just be a perfunctory procedure.

Periodic changing or "updating" of regulations may increase their effectiveness by implementing improvements in technology, but at the same time they create added costs and uncertainties for the energy industry since the energy industry plans new development at least five years ahead of construction and operates facilities for an even longer period.

Identified Study Needs

- An important conclusion to be drawn from this discussion of regulations is that the regulators have an insufficient understanding of (1) the factors that must be controlled in order to obtain their objectives and (2) of the existing constraints on private and public operations that may make regulations difficult for those sectors of society to implement. Businesses, for instance, will have a harder time obtaining capital loans if their market risk is increased by uncertainties about meeting regulatory requirements at a later date or by a decreased margin of profit caused by added costs to meet those requirements. The same is true for communities that wish to float bond issues. It was suggested that a more integrated picture of how the various parties involved in Appalachian energy activities function and how they interact is needed in order to provide a better understanding of how implementable future regulations will be.

- A means must be developed to compare the quantitive and qualitive costs, benefits, and risks of different regulatory approaches designed to yield a particular benefit for society.

- Regulatory alternative designed to achieve more comprehensive regional growth planning should be investigated. Various tax incentives designed to induce industry to carry out social "responsibilities," such as housing, water and sewerage systems, and other infrastructure development, should be analyzed. Additionally, more comprehensive regional development planning should be done.

- The institutional structures responsible for making and promulgating regulations require definition and analysis to determine the causes of ineffective enforcement. Legislative changes that may be required to correct these problems should also be identified.

## ISSUE 4 - WHAT SHOULD BE THE PRINCIPAL OBJECTIVES OF AN APPALACHIAN ENERGY TECHNOLOGY ASSESSMENT?

### Concerns of the Interest Groups

It was evident from the start of the workshop that participants had varying views not only on what particular aspects of Appalachia's energy activities should be studied in the near future, but also on what form a single, comprehensive assessment of the Region's energy future might take. Many of the specific, problem-oriented suggestions of study needs have been stated in the previous three issue summaries. Some more general ideas about what one should try to accomplish in an Appalachian energy assessment and how such a study should be carried out are addressed in what follows. To facilitate discussion, the presentation is broken into five parts: an assessments purpose, objectives, audience, geographic scope, and time frame.

Purpose--

There appeared to be general agreement that the overall purpose of any Appalachian energy assessment should be to provide a better understanding of current energy activities in Appalachia and of the possibilities for future change and growth. Groups need a clearer understanding of how the parts of the Appalachian energy "machine" function together and fit into the Region's socioeconomic framework. They also need to know how decisions that are made over the short term will alter the Region's character both in the near future and over the next quarter century.

The principal disagreement associated with a study's purpose was whether that study might best try to be the basis of an energy development plan for the Region or provide an assessment of the alternative energy resources and technologies that are, or may become, available for development. The assumptions underlying a study leading to a development plan were that the Region needs to continue to grow economically and that continued exploration of its energy resources is required to insure economic expansion. Since coal is the principle available fuel, research emphasis should be placed on its extraction and use. In such a study the means of creating and meeting demands for Appalachian fuel and power would be analyzed and ways of minimizing the environmental and social burdens of expanded energy systems would be investigated.

Other participants were concerned that such an approach would merely tell people what was required to expand coal-based economic development instead of providing them with a description of the possible alternatives (in terms of energy types, rates of expansion, and so on) to planning the Region's future. They did not want research that would be principally used by existing energy companies and government bodies to continue present activities on a larger scale, but they wanted results that can also be used by those who feel the need to reduce the Region's exploitation by industry and by those requiring energy elsewhere in the United States. For this group, an Appalachian energy assessment would be one important component to the information required to allow all of the Region's inhabitants to become involved in deciding their future.

A third alternative was to have an assessment focus narrowly on the environmental consequences of energy development with the intent of identifying problems in advance and determining means of dealing with them. Such an approach would not promote any particular form of development (such as expanded coal mining). Instead, it would try to identify which types of development were likely and look at the advantages and disadvantages of each. Economic, as well as environmental, impacts of future activities would be considered in order to evaluate the trade-offs associated with protecting the latter. Since there is a high probability of greatly expanded coal production, the focus would be on the alternative uses of that resource. At the same time the contributions that alternative energy resources could make would also be explored and, at the least their major advantages and disadvantages as compared to coal would be analyzed.

No matter what focus was chosen for a study, concern was expressed that it might try to cover too much ground for the resources that it had available. This would lead to fairly insignificant contributions to our understanding of a large number of areas. Both the study scope and the specific problems within that scope need to be chosen to reflect work that can be performed within resource limits. In many cases, simply identifying major problems so that later research can be done on them will be a sufficient and important contribution.

Objectives -

The objectives of an Appalachian energy assessment reflect what the study should accomplish in order to fulfill its purpose. They are a set of research results (for example, documents, participant learning experiences) that reflect the priorities set by workshop participants with respect to which components of Appalachia's energy activities are most important to understand.

The objectives of future Appalachian energy research are listed under "Identified Study Needs" in each of the three issue discussions. In addition to those energy-oriented study objectives, there were two further objectives associated with the study process.

- First of all, any assessment should investigate the credibility of past studies on the Region's energy activities and indicate the extent to which data bases are available for use in analyzing current or future problems. There was a feeling that to some extent Appalachia had already been "studied to death." Despite all this past work, existing results have never been fully utilized because no one has ever determined how they compliment each other and what gaps they have left in our understanding of the Region.

- Secondly, more of a commitment to include Appalachian interest groups in the study itself should be made so that their knowledge can be utilized and their concerns known. Too often, few know about a study or its findings until the study is near completion, and then it is found that outside investigators have not sufficiently understood the Region and its attributes and problems.

Audience -

Energy production and use affects everyone in some manner. Given the limited resources available, however, one must prioritize and look for similarities in the needs of different groups as one plans a research program.

There is a need to answer such questions as: How does one determine which interest groups to involve in the study process? And whose needs should an Appalachian energy assessment fill?

Neither question was ever given a clear-cut answer in the workshop. There was a general consensus that industry and public interest groups all needed a common base of information from which to draw their own conclusions and from which to suggest their own ideas for future growth. There was also the feeling that this information needed to be communicated to State and Federal decision-makers (legislators, as well as agencies), so that they better understand how Appalachia would be affected by policies that might affect even larger geographic areas (for example, the nation). This is particularly true in the energy policy arena, where current uncertainties are inhibiting long-range planning in Appalachia. The need for a comprehensive analysis also exists in such areas as environmental and social policy. These policies may constrain development. In any case, they have to be sufficiently flexible to respond to energy expansion as it occurs.

Given the large number of interest groups concerned with energy, it might be wise to consider a two-tiered approach to working with audiences. In the first tier would be the Federal and State agencies and legislators. They are involved in making many of the decisions and policies that affect what happens in the Region. Also, the legislators directly represent the interests of industry and the public. An energy assessment might be oriented towards supplying information about the problems that the members of this first tier will have to address.

Industry, public interest groups, and local government officials would form a second-tier audience. They would also be involved with any assessment from the outset so that their ideas and interests would be transferred to the first-tier audience during the assessment, and subsequently become part of a final study output. Federal and State agencies develop many programs for implementation at the local level or that affect local activities. By participating actively in an assessment, these more local interest groups could indicate how programs should be developed and regulations set if they are to effectively help to solve local problems.

This two-tiered mechanism would also mean that each of the second-tier interest groups would be obtaining much of the information that they need in order to organize and solve some of the problems concerning them individually. In addition, all would be supplied with a common base of information for further discussions of common problems.

Since many of the industry and public activities are affected by State and Federal decisions, this scoping of an assessment audience could still produce a large contribution to better informed decisions about Appalachia's energy future. At the same time the inclusion of parochial interests would help to insure that, as one workshop participant stated, this is "not just another government study" that didn't respond to their needs or take the unique characteristics of the Region into account.

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Geographic Scope -

Appalachia is in no sense an isolated region, nor is it one with uniform characteristics. Both these facts must be considered when scoping a study of its energy future.

Appalachia is presently an exporter of large amounts of energy in the form of coal and power. In the future it may be called upon increasingly to supply these resources and new ones in the form of synthetic fuel and expanded hydropower. (The East Coast, in particular, is seen as an expanding market for Appalachian energy.) In addition, energy demands both inside and outside the Region are supplied by other fuels such as natural gas and oil to which Appalachia makes a small, though in some cases significant, contribution. Because of these facts, any assessment of future energy activities needs to consider market forces exogenous to the Region and their effects on the amounts and types of energy development that they may induce.

Appalachia can be divided into roughly three subregions--an industrial north, an energy producing and often economically depressed center; and a rapidly growing south. Each of these subregions is in turn divided politically by state boundaries and its own environmental characteristics. Workshop participants frequently emphasized the need for any Appalachian study to define these subregional variations through process of data collection, impact analyses and the like are sensitive to geographic differences. This lack of homogeneity affects the way that the type and consequences of energy activities vary within the Region and consequently the ways in which they might be managed.

Timeframe -

Though not discussed at great length, there appeared to be general agreement that the period of most importance might be roughly defined as 1985 to 2010. In many instances, specific dates were not mentioned, but it appeared that this mid-term period warranted study for several reasons. First of all, it was far enough removed to provide a strong possibility that more immediate actions could be taken to affect that period as a result of study findings. Yet it was not so farsighted that the uncertainties of its findings would make them of little immediate practical value. Since the anticipated study would be producing results through about 1983, it might be anticipated that they would be of use until about 1985 without significant updating.

The understanding of mid-term consequences of these near-term decisions seemed to be particularly important. What future opportunities will be lost by decisions made in the next few years? How long can we wait to make decisions or to continue on a particular development path before we have irreversibly committed ourselves to some future course? How soon do we have to start acting to reach a goal that is decades removed (for example, non-energy resource oriented economy)? All these questions seemed to be raised either explicitly or implicitly by participants.

It was pointed out that between now and the beginning of the twenty-first century, substantial changes would not be expected in the technology involved in Appalachian energy supply systems. Few, if any significant innovations are anticipated in coal extraction methods, although some European techniques

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might be usefully explored for intercontinental technology transfer. In the area of conversion technologies, commercialization of synthetic fuel processes is to be expected during this period if market conditions are right. Even more innovations may appear in the energy end-use domain, and these could lead to shifts in the relative demands for different fuels (for example, as a result of growth in cogeneration or electric cars).

While the technological changes that might occur during this period were mentioned in some detail, there was less specific comment about the socioeconomic and practically no mention of the institutional and legal changes that might occur. As the first issue raised in this section would suggest, the need for better communication is being seen as increasingly important to conflict resolution by those in the Region. In addition, there appears to be a growing movement by the citizenry of Appalachia to be heard and to be involved in order to protect their interests.

Another concern also seemed to exist for a broad spectrum of interests, namely that Appalachia may again experience an economic bust following the present boom in coal production. There was no indication of how soon this could be expected to occur. This is to be expected, given the nation's presently uncertain energy policies. Probably more important, however, was the apparent lack of any clear-cut ideas on how to presently prepare to either minimize the rate at which coal production might decline or to minimize the resulting impacts, presumably through some means of economic diversification.

## APPENDIX A

## WORKSHOP AGENDA

*Monday, January 8, 1979*

| | |
|---|---|
| 8:00 p.m. - 10:00 p.m. | Registration<br>(Hotel Lobby) |

*Tuesday, January 9, 1979*

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|---|---|
| 8:00 a.m. - 9:00 a.m. | Registration<br>(Foyer, Sheraton B) |
| 9:00 a.m. - 9:45 a.m. | Opening Session: Introductory Comments (Sheraton B) |
| 9:45 a.m. - 12:00 noon | Small Group Sessions: Extraction, Conversion and End Use<br>(Locations to be designated) |
| 12:00 noon - 1:00 p.m. | Lunch<br>(Empire Suite) |
| 1:00 p.m. - 4:30 p.m. | Small Group Sessions (cont'd.) |
| 4:30 p.m. - 6:00 p.m. | Cash Bar<br>(Empire Suite) |

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*Wednesday, January 10, 1979*

| | |
|---|---|
| 9:00 a.m. - 12:00 noon | Small Group Sessions (cont'd.) |
| 12:30 p.m. - 1:30 p.m. | Lunch<br>(Empire Suite) |
| 1:30 p.m. - 3:00 p.m. | Closing Session: Summarization and Discussion of Small Group Findings (Sheraton B) |

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# APPENDIX B

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# APPENDIX C

## APPALACHIAN ENERGY DEVELOPMENT:
## THE NEED FOR THE ASSESSMENT AND THE WORKSHOP*

### INTRODUCTION

This appendix is an introductory paper to the Workshop on Energy Development Issues Affecting Appalachia that describes why the Environmental Protection Agency (EPA) plans to initiate a study of Appalachia, why the Appalachian Regional Commission (ARC) is co-sponsoring the project, and what methodology has been chosen for performing the study. It also elaborates on why the workshop is being held at this time.

Later in Appendix D, the importance of identifying and analyzing the issues involved in energy development is discussed further. That Appendix also presents several examples along with the conflicts that arise between them and other interest groups who are involved in or impacted by those systems.

### BACKGROUND

The EPA and the ARC propose to undertake an assessment of how energy development will occur over the next quarter-century within a particular physical environment and economic and social setting: the Appalachian Region. Studying Appalachian energy implies emphasis on problems related to development of coal resources and the technologies to be involved in their extraction, conversion, transportation, and utilization. Other energy supply systems, such as nuclear-generated electric power and oil and gas will also be investigated since the agencies wish to understand how the complete Appalachian energy supply/demand system may develop and the role this region plays in the energy economy of the Eastern United States.

The Appalachian Region covers 397 counties in all or parts of 13 states (Figure C-1). Besides the numerous types of energy development found in the region, there are variations in its physical, political, institutional, and economic character.

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*Authored by Benjamin L. Blaney, Industrial Environmental Research Laboratory -- Cincinnati, United States Environmental Protection Agency.

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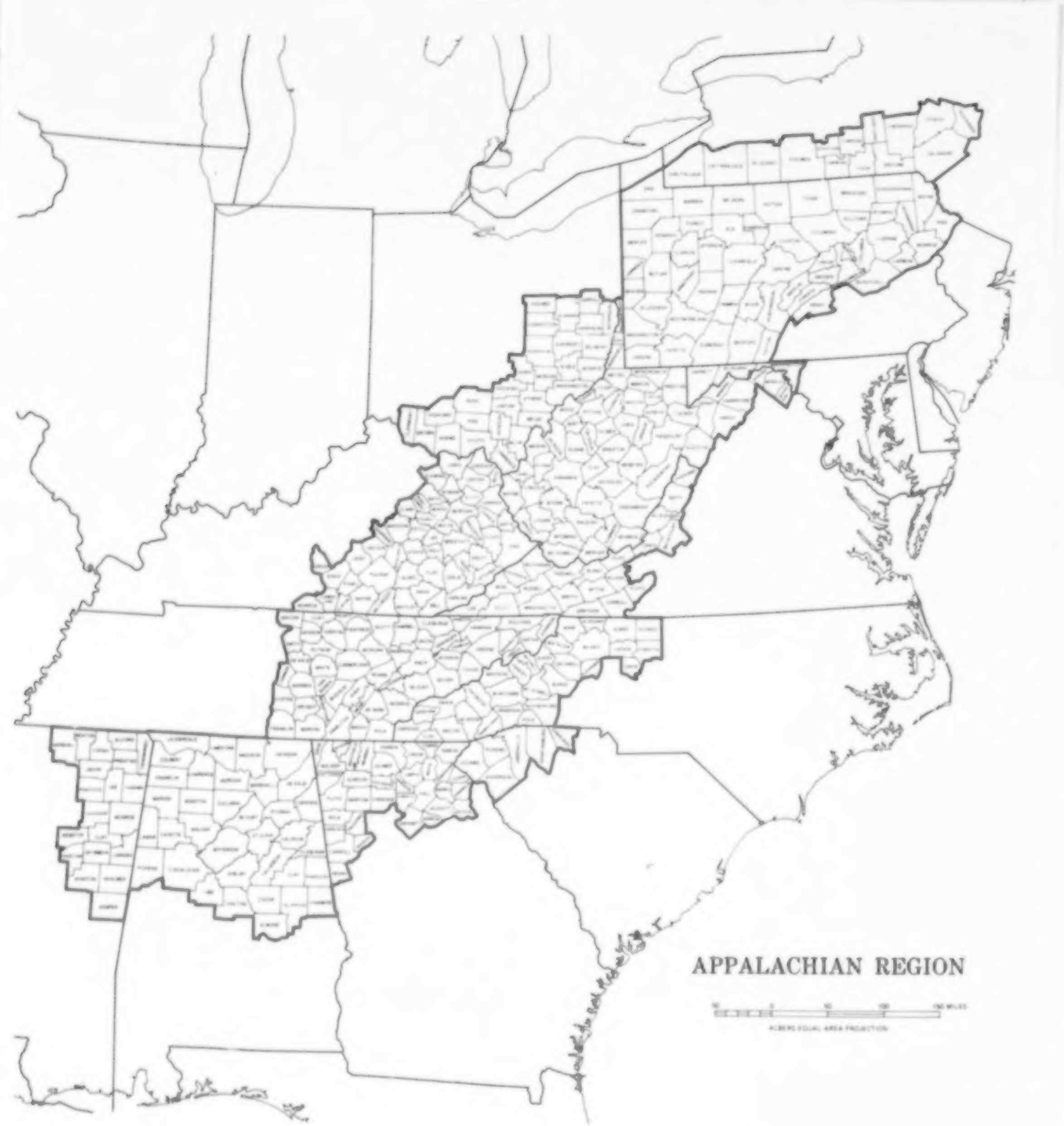

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Figure C-1. The Appalachian Region

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In addition, understanding how energy development occurs in any region does not simply require a study of the physical technologies involved and their direct economic and environmental impacts. It necessitates analyzing how development will occur within the constraints placed upon it by society, while still responding to the goals of those immediately involved in its growth, (for example, private energy industries). It also necessitates understanding what the different interests of these parties are and why conflicts arise between them.

The future of Appalachia will, to an important degree, be determined by the decisions concerning energy development that are made by these many different interest groups or their representatives. Those decision-makers require an understanding of how energy development might occur, what its consequences may be, who it may affect, and what alternative approaches to energy growth exist. In short they require an integrated picture of Appalachian energy. The intent of the proposed study is to supply a better understanding of what the picture looks like.

All of these factors--the heterogeneity of the Region, and the diversity of technology development and the decision-maker's needs--present researchers with several problems. One is to find a methodology that allows for the systematic investigation of energy development in the Region. Another is to determine which energy problems and issues to emphasize. Still a third is to gain a better understanding of the interest groups involved.

## WHY ARE EPA AND ARC DOING THE ASSESSMENT?

In 1974 the EPA was chosen by a Federal interagency task force to coordinate an Energy and Environment Research and Development Program. This program involves research efforts by 17 Federal agencies.[1] Its objectives are to understand the social and economic, as well as the health and ecological, consequences of energy development and to identify alternative policies for managing development that are "environmentally, socially and economically acceptable (author, 1974).

The Program is responding to the realization that it is not enough to consider solely the direct consequences of development. It is also not sufficient to investigate just environmental impacts or just socioeconomic ones. The chain of interlinking events associated with development needs to be identified and analyzed.

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[1] Included among these agencies are the Energy Research and Development Administration (now the Department of Energy); the Tennessee Valley Authority; the Department of Interior; the Department of Health, Education and Welfare; and the Department of Agriculture.

Responsibility for coordination of the Program was placed in EPA's Office of Energy, Minerals and Industry (OEMI)[1]. This office determines what research studies are to be conducted under the auspices of the interagency program. It also sponsors its own research projects to integrate the results of these studies in to a more comprehensive understanding of energy development.

Part of the Program's research involves assessment of the environmental, socioeconomic, legal and institutional impacts that energy development will have in our country in the future. Some of these assessments are looking on a national scale at specific parts of individual energy supply systems, such as electric utilities. Others are focusing on particular regions of the United States, such as Appalachia or the Rocky Mountain-Northern Great Plain States, where greatly expanded energy extraction and conversion are expected.

Unlike the national studies that are oriented toward a particular technology, these regional studies are considering a number of fuel resources and energy supply chain alternatives. Consequently, they do not just focus on the technologies involved but investigate how energy development in general will occur in a region. This requires understanding a more complex set of the alternative types, settings, and rates of development, as well as the trade-offs involved in choosing between them. It also requires understanding how change will occur within the existing legal, institutional, and political environments of a region. In other words, who will react to change? Who will be involved in causing it to happen? Through what mechanisms will these parties act?

If these studies can be properly accomplished, they will provide a more complete and thus more realistic picture of the consequences that society and its different interest groups may expect to face as a result of their decisions about how future development should occur.

The EPA sought the involvement of ARC in the assessment of Appalachia because of the Commission's involvement in the Region's socioeconomic growth. The interest of the ARC also stems from its responsibility, under the 1975 Amendments to the Appalachian Regional Development Act, to provide a framework for coordinating Federal, State, and local efforts to deal with increased national demands on the Region's energy resources. This includes anticipating the effects of alternative energy policies and technologies, and planning for accompanying growth and change.

## THE PROPOSED STUDY METHODOLOGY--TECHNOLOGY ASSESSMENT

EPA has chosen to use the technology assessment (TA) methodology in its regional energy studies because in theory this approach allows a study team to provide a fairly complete information set needed for the decision-making process. Using TA, researchers can develop an understanding of the problems arising from technology utilization and expansion, and of the parties who are affected. They then proceed to identify and analyze alternative means for mitigating those problems. The analysis of these alternatives includes not only determining whether they can be put to use within our existing legal and institutional systems but also how those alternatives may change the nature of the problems and how different parties of interest may react to them. In short, this part of a TA leads to the presentation of the trade-offs associated with selecting alternative courses of action.

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[1] OEMI is a program office within EPA's Office of Research and Development.

TA provides a systematic approach to gathering and analyzing this information for the decision-maker. While there is no one accepted formula for performing a TA, there are several common phases to such studies. Those four phases are shown on the right-hand side of Table C-1. A breakdown of the steps that are often involved in each phase appears on the left.[1]

In the descriptive phase of a TA, the team defines technologies and the regional environment (that is, the Region's physical and social characteristics its economy; its legal, institutional, and political structure; its culture; and others) in which those technologies operate and with which they interact. Present problems associated with technology operation are identified, as are the possible future courses of development of technology and the problems and issues that may arise. Based on this, the team sets objectives for the study itself and identifies alternative futures or "scenarios" for analyzing what the Region's future may hold in store.

In the impact assessment phase, the consequences of developing a technology or combination of technologies are analyzed. The study team starts by investigating primary or direct impacts of technology development. However, it goes further and investigates secondary and higher order impacts as well. The team compares the magnitude and timing of those impacts depending upon the different environments, both physical and social, in which the technology is being developed.

Table C-1 next shows the policy analysis phase. Having determined what impacts or changes in the existing situation are caused by technology growth, the team tries to learn how the people in the Region perceive these impacts, whether it be from their roles as industrialists, as representatives of society (for example, in government institutions), as members of public interest groups, or other affected groups. Here the team is asking questions such as: what are the conflicts that underlie the issues?, what value systems have resulted in these conflicts?, and why are these conflicts so important to certain interest groups and to Appalachia in general? In addition, the TA tries to identify what systems exist for dealing with those issues and how they operate. This includes not only understanding how government agencies deal with the problems or how they would be handled within the legal systems, but also how businesses or public interest groups decide how to respond.

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[1] Included among these agencies are the Energy Research and Development Administration (now the Department of Energy); the Tennessee Valley Authority; the Department of Interior; the Department of Health, Education and Welfare; and the Department of Agriculture.

## TABLE C-1. TECHNOLOGY ASSESSMENT PROCESS

| | |
|---|---|
| 1. State-of-the-art review<br>- existing data and models<br>- past and on-going research<br>- issues and concerns of interested parties<br>- characterization of the technology and the existing "environment" (biophysical and social)<br>2. Problem definition and bounding<br>- sponsors objectives<br>- available study resources<br>- nature of problem<br>3. Projecting alternative futures<br>- technology choices<br>- socioeconomic and institutional/legal climates | DESCRIPTIVE PHASE |
| 4. Impact criteria selection<br>- for comparison of effects of differential technologies<br>5. Impact assessment<br>- impact chain identification and analysis<br>- sensitivity analysis<br>- comparison of impacts | IMPACT ASSESSMENT PHASE |
| 6. Further identification of issues arising from development and characterization of social environment<br>7. Development of alternative policies<br>- alternative technology mixes, timing, and location<br>- alternative means of controlling development<br>8. Assessing policy implementation<br>- assessment criteria<br>- changes in impacts<br>- constraints and barriers to implementation<br>- comparison of policy alternatives | POLICY ANALYSIS PHASE |

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TABLE C-1. (continued)

| | |
|---|---|
| 9. Dissemination of conclusions<br>- final reports on development consequences, policy alternatives and research needs<br>- technical assistance to users through seminars, workshops, and consulting | DISSEMINATION OF RESULTS PHASE |

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At this point the study has a better understanding of why different types mixes, and timing of energy developments lead to different impacts, both beneficial and determental, in the Region and of how society may react to and deal with those problems. Within the policy analysis phase the next step is to develop alternative policies, or courses of action, that might be taken to change the direction of development in order to alter those impacts. Different technologies may be suggested, as may be changes in the legal or institutional structures that affect how those technologies are regulated.

The ultimate objective of the policy analysis phase is to determine how effective policy alternatives are in resolving the problems and conflicts that technology development may have created. The study assesses what might happen if a decision-maker chose to try to implement a particular policy. The team goes back through the impact assessment phase and analyzes how the consequences of development have been changed. This allows for a comparison of the trade-offs among these new impacts, as well as the new impacts and those generated by the initially hypothesized course of development.

The final phase of the assessment involves disseminating this material to the decision-maker in a form that makes it readily accessible to him. Besides reports, this sometimes involves seminars and workshops to allow those who have an interest in the study to get a better understanding of the results that have been developed. The TA also documents what further research needs to be done in particular areas that the assessment has covered.

Just where in the TA methodology Appalachian assessment needs to place emphasis has yet to be determined. It will certainly vary with the topic area under consideration. As an example, consider environmental assessment of different technologies. One does a preliminary environmental assessment when a technology is in its embryonic stage and a more detailed analysis with operating facilities. Another is geographic scale of analysis. While much is understanding of facility-specific environmental impacts, long-range cumulative or synergistic impacts are of growing concern as the density of development increases.

The study team must initially determine at what state our understanding of each of Appalachia's environmental and other problems lies. What problems are most important to consider and what aspect of each of them do we need to get a better picture of?

## WHY THE WORKSHOP?

There are several problems facing the initiation of the regional assessment. The scope of the proposed study is broad. The region to be investigated is heterogenious in terms of its physical, social, and economic characteristics, as well as in the structure of its energy supply systems and energy development patterns. Thirteen states, each with its own legal and institutional structures, and social and economic goals, provide 13 different institutional environments in which development will occur. Also, Appalachia is being subjected to numerous external forces that affect energy development. National desires for reliance on domestic fuels, safe working conditions, and a clean environment have placed strong new demands and constraints upon how energy development will occur. All these factors make Appalachian energy supply systems, their impacts, and resulting problems and issues difficult to comprehend. Additionally, limits on time and money restrict both the extent and depth of the proposed research project. Consequently, one of the important first steps for this technology assessment is the identification of the areas it might best focus upon.

This is one reason for holding the workshop. The second reflects the attention that we wish to give to understanding the groups involved or influenced by Appalachian energy. For instance, what high-risk decisions do they have to make in the process of building and operating energy facilities, or what "bottlenecks" are keeping them from achieving their goals in as effective a manner as they think should be possible? What changes might be made to promote effectiveness? What other interests may these changes be in conflict with? Some specific examples of the complex set of considerations that parties such as mine operators are faced with when making day-to-day decisions are presented in Appendix D entitled "Appalachian Energy Development: What Are the Issues?"

The questions cited here and the examples given in Appendix D are just a few that might be raised in an attempt to elucidate the problems and issues associated with energy development--both those of the present and those that may occur over the next twenty-five years. We view the workshop as a combined effort by different interest groups to (1) identify these concerns, (2) find out what the basis is for the conflicts surrounding them, and (3) learn which of these concerns are of enough importance to these groups, and to Appalachia in general, to be considered for study in our TA?

## WORKSHOP FORMAT

To achieve these objectives we are bringing together a group of individuals from private industry, special interest groups, and government agencies. All have interests of one form or another in Appalachian energy development. We are dividing the participants among three discussion groups considering issues arising from different segments of the energy chain: extraction, conversion, and energy end-use. This approach was chosen for two reasons. First, it results in smaller groups, thus providing an opportunity for all to participate, and second, this breakdown gives focus to the discussions.

The groups will begin by identifying the activities in the three areas of extraction, conversion, and energy end-use, and then proceed with discussion of the associated issues. Discussions will not be be restricted to the physical technologies and their impacts but will broaden to include the economic, political, and legal and institutional concerns that surround their development and operation.

The extraction group will focus principally on issues and problems associated with resource availability and quality and the involvement of different groups and individuals along the energy chain from its extraction, to its storage, beneficiation, and finally to its transport and marketing to the consumer. As is the case with all three group sessions, the extraction group will not only be considering the conflicts between government, private business, or environmental and other special interest groups, but those arising arising between members within these groups. Some examples are given in the accompanying paper.

In the conversion group, participants will start by considering the benefits and problems that are derived or may be derived from the present operation and future expansion of electric power plants, the introduction of synthetic fuel facilities, and from other conversion processes. The distribution of power and fuel from these facilities will also be discussed. In each case, it is anticipated that problems and issues will be identified that arise at each stage in the life of a facility from the original planning, through permitting, construction, operation and, finally, shut down.

The third group will discuss energy end-use issues. For purposes of this workshop energy "end-use" means the use to which energy is put before it becomes economically unusable and is wasted. This includes "intermediate" demands for energy corresponding to industrial and commercial purchases to produce products and services for end-consumers. It also includes "final" demand, or the purchase of energy for end uses such as automotive fuel and residential heating and cooling.

Participants will divide into their respective groups after a brief introductory session on the first day of the workshop. Each group will continue its discussion through the morning of the second day. These sessions will culminate with the identification of these issue topics each group feels are most important to Appalachia. After preparing a summary of their group findings, workshop participants will reconvene to learn what other groups have concluded and to discuss those findings.

There will be stenographers and observers present during the sessions so that discussions can be documented and summarized in a conference proceedings* to be distributed to participants and made available to the public as soon as practicable after the workshop.

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*No verbatim transcripts will be published and the proceedings will contain no quotes attributable to individual participants.

# APPENDIX D

## APPALACHIAN ENERGY DEVELOPMENT:

## WHY ARE THERE ISSUES?*

A central function of policy analysis is the surfacing and anticipation of issues. To set the stage for everyone participating in the workshop, this Appendix seeks to clarify what is meant by an issue, and, through some examples, to set forth what perspectives of energy development are expected to arise from the issues workshop.

In short, the Appendix D seeks to identify some issues involved in the assessment of energy technology, to provide some understanding of the nature of the authorities and conflicts in interests involved, and to assess their significance to Appalachia. Not all problems, issues, or interests are covered, but the complexity of the opposing interests may be exemplified and some issues of importance to Appalachia will be surfaced.

### TECHNOLOGY ASSESSMENT AND ENERGY POLICY

Technology Assessment (TA) is an evolving class of policy-oriented studies that are concerned with the impact of technology upon society. Policy questions often revolve around decisions concerning whether to advance or retard certain types of technologies in order to further the goals of a specific institution or of society overall. TA attempts to assist in these decisions by unraveling the interrelated chain of events that likely follow upon the introduction of a new or expansion of an existing technology. It seeks to establish those critical factors in the physical, technological, and institutional environment that govern the development and deployment of a technology. By tracing the likely path of these events, the environmental, economic, and social effects and conflicts arising from variations in scale, timing, location, and mix of technologies may be delineated and the differences among alternative policies clarified.

Energy policy poses profound technological choices both within the energy economy itself and for society at large. Energy policy implies choices among the fuel resources (coal, oil, gas, nuclear power, geothermal, solar, and others) that are in the national interest to develop, as well as among the most appriate techniques to be used in making its energy available (coal extraction, *in situ* gasification, coal liquification, electrification, and others). The choices are not simple because each may imply a different technological infrastructure in the extraction, conversion, distribution-transportation, and utilization, as well as in the environmental and institutional control, of energy development.

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*Authored by Michael Newton, Appalachian Regional Commission.

Energy plays a pervasive yet subtle role in our everyday life. It provides a source of power, heat, and light by and through which everyday economic and social life is run. Shifts from an oil-based energy economy, to a coal, nuclear, or renewable resource-based economy may cut deep into our way of life. The nation has undergone such transformations before: such as the changing of our lighting from kerosene, to gas, to electrical systems; of our power from hydro and wood, to coal and steam, to gas and electricity; and of our transportation from animal, to wood and wind, to coal and steam, and finallly, to oil and gasoline. Today, however, our understanding of the far-reaching economic, social, and environmental consequences and trade-offs of different energy technologies is much greater, and our desire to consider these choices in a deliberate fashion is more resolute. Technology assessment attempts to delineate the choices.

The far-reaching consequences and depth of intrusion of an energy policy into our lives assures that it is controversial. It is asserted by some that all the nation needs is the will to establish some particular policy to provide direction. They then claim that industry, consumers, and everyone else will achieve the policy's goals. This presumes that there is a consensus on energy policy. To the contrary, energy policy means many different things to different people, and on occasion different things to the same individual.

To some, energy policy may mean reduction in oil imports and freedom from embargo imposed by foreign powers. To others it may mean uninterruptible supplies at minimum costs; a "Manhattan-type Program" for breeder reactor development; a relaxation of the regulatory requirements that are fettering the coal mining and electric utility industries; the minimization of potential hazards to the physical environment, the health and safety of the population; encouragement of the conservation ethics; or promotion of renewable resources and soft technology alternatives. The list is long and permutations are endless.

With so many conflicting views of the goals and objectives of energy policy expected, an aimless and halting approach to policy development and an unsatisfactory formulation of policy direction is inevitable. Too many different parties and groups of people are too closely involved to expect it to be otherwise.

Many energy studies precipitated by technological development focus almost exclusively on analyzing the physical technologies, but have paid scant attention to understanding the parties involved. As a result they emphasize the physical nature of the impacts of those technologies, not the conflicts or issues that arise from those impacts. To further advance the energy policy debate, not just a description of the physical aspects of energy development

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is needed, but also an understanding of how the involved interest groups participated in development and of what interests they have at stake in energy policy.

For Appalachia, a lot is known, though perhaps not enough, about the energy technologies that are or will be developed. Much less is known about the issues and the parties involved in those issues. An important element to be gained by a TA is the development of an understanding of those parties of interest and the issues that involve them. An appreciation is wanted of energy development in Appalachia from the view of those parties involved in the Appalachian Region want energy development to be appreciated.

## WHY ARE THERE ISSUES?

The dictionary defines an issue as "a matter that is in dispute between two parties" or more generally a "matter in which the interests of two or more parties are in dispute." By "interests" is meant (again resorting to the dictionary), anything in which a party participates in an "advantage or shares responsibility." This is a broad definition of interest that includes on one extreme individual self-interest of the parties and on the other, philanthropic concern for the general social welfare for some other individuals. Each, however, may be looked upon as a "special interest" of society as a whole.

The source of the interest may arise from legal rights of ownership, possession of financial or other economic interests, common law or statutorially recognized rights or duties, social customs, or traditions honored by society.

Conflicts arise partially because there is an unequal sharing of the aforementioned "advantages and responsibilities" within society. American society and the energy economy are pluralistic in character. There are many separate business, social, and political entities competing against each other. But their cooperation is necessary for reaching social goals. Our society relies upon the synergistic effect of these diverse interests, both private (for example, mining, utility, railroad, and banking companies) and public (for example, natural resources, environmental, and economic regulatory gencies); each pursuing its own special interests to achieve the goals and objectives of society.

Roles and authorities are divided among these groups, creating a fragmented and complex set of overlapping and conflicting jurisdictions, and interacting lines of authority. For example, a mine operator is authorized to conduct mining activity by the right of ownership or lease to mineral rights to a piece of land, by the license to do business in a state and by the granting of various permits. The primary concern of the operator is the making of a living through the profits from mining. He may be concerned with the environmental disruption arising from the mining and required to meet certain standards as a condition of permit to mine, but these must be weighed against the economic realities for his making a profit. A neighbor or surface estate owner may, on the other hand, view the environmental damage as of paramount concern, since he may not participate in any direct economic advantage from mining and may suffer significant damage to property, health, and

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even life because of it. The neighbor may pursue redress of this damage by economic means, through purchase of mineral rights, by civil suit for damages, or politically by seeing that laws are passed to create a government agency with authority to monitor, oversee, and regulate mining activities. He must weigh the potential environmental and economic benefits from these actions against indirect economic (and social) costs because of the possible areawide impact upon the level of mining activity.

There must be a balance between the competing goals and interests of parties within society. At any point in time, society continually is seeking to resolve issues arising from conflicts between parties and to establish new institutional arrangements for society in order to improve and advance their special interests.

There is a dynamic quality to this search for new accommodations in the tensions between the various interests. Depletion of resource, discovery of new deposits, technological innovation, and modification in organization or regulatory climate upset the pre-existing relationships among interests and the institutionalized alliances among the parties. The balance of interests are shifted, accentuating some conflicts and attenuating others. New issues arise. Society seeks to move toward new accommodations and arrangements among the interests that are more conducive to coordinating their competing activities.

## WHAT ARE THE ISSUES? NATIONAL SETTING

The Arab oil embargo is one example of such a traumatic, status quo shattering event to the energy economy. Its initial impact was to dramatically illustrate the hazards to U.S. military and political interests as a world power of the increasing reliance upon foreign sources of energy supply that are vulnerable to disruption by foreign political interests. The embargo also was the occasion of the formulation of an aggressive oil pricing policy by the Organization of Petroleum Exporting Countries (OPEC). Internationally, the sharp rise in the price of imported oil worsened the deterioration in the U.S. balance of trade and payments and the decline in the value of the dollar. This decline is indicative of a long-term conflict between oil importation and other national economic interests.

Domestically, the shift in national interest is more complex. The increase in world energy prices raised the relative value of domestic energy resources. A rise in domestic energy prices in the energy market runs counter to interests in keeping overall price levels down. It conflicts with national anti-inflationary policy and consumer interests,--in other words, with those who question the real need for increases in energy prices. The embargo also disrupted the pre-existing energy-environmental policy accommodation of reliance upon relatively inexpensive, low sulfur foreign oil to satisfy environmental standards. The increase in worldwide energy prices also increased the attractiveness of formerly uneconomical or marginal energy resources. Coal deposits, previously too thin or deep, and secondary or even tertiary recovery of oil and gas became of interest. Western coal deposits, and North

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Slope and Outer Continental oil and gas resources suddenly took on major importance to national energy policy. However, exploration of these resources raised new environmental questions.

The result of all of these efforts has been the disruption of the political coalition for a domestic energy policy based on continued oil importation and the throwing of environmental, economic, energy, and other goals into conflict.

The foregoing discussion indicated the broad sweep and general character of the conflicts raised by energy policy. A deeper probing is required of the conflicts in authority among interested energy development parties. The next section provides a cursory introduction to such interests, and a tentative exploration of the nature of the conflicts in the context of Appalachian coal. The issues raised give a perspective of the concerns underlying some basic questions about coal development in this Region.

## WHAT ARE THE ISSUES? APPALACHIA

### What is the Potential for Appalachian Coal Development?

Potential Appalachian coal development is dependent upon the adequacy of the quantity and quality of resource, the suitability of mining technology to the geology, and the availability of markets. Prime responsibility for the development and investment decision rests with private industry; with government playing a critical but supportive role.

Business and financial investment decisions are based upon the evaluation of mine owners and bankers relative to the market risk entailed in meeting all the obligations of the borrower. The risks to be considered are: whether there is an acceptable resource of recoverable coal to meet the quality and quantity requirements of a given market, whether the property can be developed to produce the coal within the time frame and economic limits agreed upon, and whether the costs of production relative to realizable market prices are sufficient to assure a cash flow to meet out-of-pocket costs and debt service, and to generate an acceptable rate of return on invested capital.

Both the lender and mine owners must assess the risks associated with development of a particular mining property, in order to determine conditions under which each is willing to participate. Consummation of the investment decisions is contingent upon negotiation of mutally acceptable conditions under which the borrowing and lending parties feel that their separate interests are adequately protected.

Terms of repayment of the loan (and royalty payments, if mineral rights are not owned outright) deemed just and reasonable by one party may be considered exorbitant by the other. The loan agreement represents the negotiated accommodation between the parties that together with the title or lease agreement to mineral rights, the operator's business license, mining permits, and other necessary documents, authorize the operator to develop the property for the purpose of coal extraction.

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Public environmental and energy agencies have responsibilities that include the research and development of production and control technologies and the establishing of appropriate pricing and allocation policies. Besides the permitting and licensing and the monitoring and review for compliance with economic and environmental regulations, State and Federal agencies directly affect private investment decisions. Public decisions dictate allowable production, control and treatment technologies, and permissible resources comcomplying with these standards, which in turn influence the accessibility and costs of burning and mining coal of a given chemical and geological quality for a given market.

## How Reliable is Appalachian Coal Production?

The ability of Appalachia to sustain a given level of coal production is dependent upon investment decisions made in new capacity and the efficiency of production practices. Both private and public agencies play a significant role in each.

The prime responsibility for mining production decisions rests with the mine operator. It is the right and duty of management to assign and schedule men and equipment to various parts of the mining cycle and to coordinate these activities in order to assure a smooth flow of coal from the face out of the mine. Identification of production, health and safety, training and maintenance problems, and taking corrective action lies with the operator.

The operator does not have a completely free hand in his operating decisions. The physical geology of the mine property, and prior planning and investment decisions, and fixed facilities and equipment all act as constraints on the freedom of action on a day-to-day basis. The operator also requires a highly skilled and motivated labor force in order to achieve high production rates and safe working conditions. The cooperation and concurrence of the union is also needed and formalized in the national contracts that not only define wage and fringe benefits but also worker rights for promotion, job bidding, and seniority, as well as work rules, minimum crew size, and health and safety practices. The contract thus establishes the rights and responsibilities of workers and operators to each other in day-to-day work relationships.

Public authorities play a crucial role because of their regulatory authority to protect worker health and safety in the mines and the natural environment. The regulations promulgated to effect these responsibilities dictate permissible and allowable equipment, fixed facilities, and mining practices that owners and operators must follow in order to reduce potential direct and indirect hazards to human health and safety and to the environment.

These three basic authorities can conflict. The operator is responsible to the mine owners in protecting their investment in the mining operation. By keeping producation costs low, the margin between the market price and costs of mining coal can be kept sufficiently large in order to realize an acceptable rate of return on invested capital. The workers have a career investment for which they seek the highest return in the form of wages for the years they have invested in the mine. Public regulations are designed to protect the natural investments in public health and safety and the environment. Worker pressures for higher wages and public agency requirements for changes in plans, operations and equipment are likely to conflict with operator responsibility to assure a smooth flow of production and to hold costs down.

## How Reliable is the Transportation Network for Delivery of Coal?

There is also overlapping private and public responsibility in the control and promotion of energy transportation. Operators must seek to coordinate production activities with purchase requirements. This may require benefication of the raw coal private shipment, as well as providing for local coal haulage, storage loading, or other coal handling facilities. To provide these services the operator may have to invest in preparation plant, conveyor, transloader rail siding, or other coal facilities, or in coal operators to provide these services.

Conflicts arise because of the differing financial and service interests of the parties. Mine operators desire reliable and efficient transportation in order to be competitive. Transportation costs represent a significant part of the delivered costs of coal. Service requirements may vary depending upon the nature of the market. If shippers are involved in the spot market, they may need flexibility of transportation capacity, scheduling, and routing in order to be responsive to the vagaries of the market. The ability to re spond in a timely fashion to the demands of a variety, and perhaps changing, cast of customers is important. Operators producing under long-term contracts may require a consistent, reliable, perhaps dedicated, service tailored to the particular customer requirements.

Trucks provide a flexible mode of coal haulage and can effectively serve both in the local distribution of coal from the mine to preparation and loading facilities, and in shipment to final customer. Capital costs to the operator are low, because trucks are self-unloading and generally do not need specialized equipment for loading. The trucks may be owned and operated as an extension of the mine logistic system. Contract truckers may be called upon to supplement or provide all the service needs of the operator.

Truck haulage of coal, with rare exceptions, relies on the public highway system for right of way. Local or State public agencies have the responsibility to provide access to property owners. This may require that the construction, reconstruction and/or maintenance of roads serving the mine operator come out of public general revenue, highway trust funds, or coal severance tax funds. Conflicts arise because in much of Appalachia the highway system has not been designed for the volume load levels that current truck technology, and in some instances regulations, permits. Because of this, even with adequate maintenance, the volume of coal haulage by truck may in effect destroy the public roads. There is also a public safety hazard because the alignment and curvature of roads designed for high vehicle traffic may not be up to standards for the heavy truck traffic. Construction to new design standards or even reconstruction of existing roads to keep the roads from disintegrating is very costly, and may be burdensome not only to the coal industry but also to local taxpayers. Continuing with existing conditions leads to a reduction in the level of highway service to the residents of the area, as well as to the coal industry, and may pose significant public health and safety dangers.

Truck haulage of coal is very expensive for long distances. Alternative barge and rail movement is more economical for long distance and high volume movements. Movement by barge on the inland waterway is the least costly way to transport coal; operating costs are lower than that of both truck and rail. However, it requires that relatively expensive loading and unloading facilities be constructed by the mine operator and his customer. Furthermore, waterway movement is relatively inflexible since barge traffic is forced to follow the twist and turns of the river which add circuity to routing the traffic and increases operating costs. The cost of transshipment may also restrict barge use to shippers located close to the waterway. Shipments of coal may be subject to seasonal disruptions resulting from freezing in winter and flooding at other times during the year.

The lower costs of barging coal results in part because the right-of-way is provided by nature in the form of the river. Public agencies have the responsibility for safety regulations and for improvements in navigation such as maintenance of channel depth and width, removal of obstructions, and improvement of stream flow through the construction of locks and dams. Conflicts arise over the use of general revenue funds for such improvements and the need for a direct contribution by waterway users for maintenance and construction of these facilities.

Railroads, because of the historical development of the railroad network, provide a flexible and efficient means for the haulage of bulk commodities such as coal. Unlike barge and truck movement, railroads must provide for construction and maintenance of right-of-way, as well as for operating and haulage equipment. Their adequacy of service, reasonableness and non-discrimination of rates, and protection of public safety are subject to public agency review.

Railroads draw upon a common financial, labor, and equipment pool to maintain and expand services. They seek to allocate this pool of resources into the best financial interest of their owners while meeting requirements as a common carrier to hold themselves open to all shippers. Conflicts may arise with mine operators on low-volume lines and cyclical or seasonal shippers over the level of service justified by shipper needs. Rail line abandonment, maintenance of track condition, reliability of delivery of hopper cars, and adequacy of coal tariffs are examples of such conflicts.

## CONCLUSION

The preceding discussion has attempted to show the number and complexities of the interests of different parties involved with coal extraction, as well as the number of constraints and often conflicting interests they must deal with.

Other examples of conflicting interests among private agents and public agencies may come readily to mind not only in the area of coal extraction and transportation, but throughout the energy supply/demand chain. It is hoped that these have been surfaced for similar discussion in the workshop.

## TECHNICAL REPORT DATA
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1. REPORT NO.
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16. ABSTRACT

This report describes the results of a workshop involving representatives of private industries, government agencies and public interest groups that was held in January of 1979 to raise and discuss issues related to Appalachian energy development. The report summarizes the issues identified by these individuals over a two-day period. The summarization attempts to clarify the different points of view of interest groups on each issue. It also indicates the information that participants felt future studies of Appalachian energy ought to set forth in order to assist the decision makers who ultimately will act on those issues.

17. KEY WORDS AND DOCUMENT ANALYSIS

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